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AUTOMOTIVE INDUSTRIES
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Foreign Trade Essential to Our National Existence

Imperative That We Secure Supplies of Raw Materials, Which Can Be Had by Exporting Manufactured Products

By David Beecroft

CINCINNATI, April 20—The necessity of all industries developing foreign trade to assure our securing from all nations of the world that supply of raw materials needed for successful prosecution of the war, for the growth and maintenance of our industries, and for our food and other requirements was the dominant note of every session of the Fifth National Foreign Trade Convention held here during the last 3 days of this week.

All of the 900 delegates registered, representing every state of the Union. Nearly every industry realized the super-imperativeness of our becoming a much greater foreign trade nation than heretofore. Our future permanency demands it. We must have foreign trade to maintain our financial standing in the war. We must sell our manufactured products to those nations from which we get raw materials as a means of protecting our exchange rate with them.

Up to the present we have been purchasing more from many nations than we have been selling to them, and to-day our exchange with them is not as favorable to us as it should be.

Merchant Ships Being Built

Although we lack shipping facilities to-day, and although our North Atlantic trade to France and our Allies demands all the tonnage we can give it, it must be remembered that merchant ships are being built to carry merchandise to all lands. Although we are restricting exports to many neutrals, to prevent materials from filtering into Germany and giving comfort to our enemy, we must not restrict exports to neutrals in Latin America, Asia, Oceania and Africa more than we are absolutely compelled to do for our war trade with our Allies.

Robert H. Patchin, formerly secretary of the N. F. T. C., summed up the proper attitude toward this when he told the convention:

"In connection with our Latin American trade, it must be remembered that whenever we restrict the export of a salable article to any country such as Latin America, or others from which we import raw materials, we at once raise the price of imports from that country. This fact must be kept in mind constantly, in view of the fact that we require such great quantities of raw materials from those countries."

Latin-American Exports Important

Export trade must be maintained with Brazil so that Brazil's manganese, rubber and coffee can be imported. Heretofore we have always imported these products from Brazil to a much greater value than that of exports of our manufactured goods to Brazil. This is an adverse trade balance. It favors Brazil and not us. It hurts our exchange rate with Brazil. It makes Brazil a creditor nation, and we take the position of a debtor nation. Instead of restricting our exports to Brazil, it is essential that we increase them so they will equal the value of our imports.

All of the 900 delegates were constantly keen to the greater necessity of our foreign trade, due to conditions created by the war. The super-necessity of our importing enormous quantities of nitrates from Chile with which to make our high explosives and land fertilizer constitutes another example of how our trade with the west coast of South America must be maintained. We must have nitrates to win this war. We must also have copper from Peru and there are other minerals from Peru and Bolivia.

It is certain that during the continuance of the war we will have more shipping tonnage available for the west coast of South America than for the east coast, due directly to the fact that our ships must bring the nitrates and minerals, and to obtain these we must export our automobiles, trucks and whatever else those west coast nations want from us.

Mr. Patchin, in addressing the convention on essentials and less essentials in our foreign trade, referred to 13 different raw materials which we must obtain during the war, and which we must continue to receive after the war in order to retain our position among the leading nations of the world. These are: Manganese, copper, tin, nitrates, rubber, fibers, gums, wool, sugar, coffee, tea, cocoa and fruits. These must largely come from Latin America and Asia, and do not include many other raw materials such as chrome and platinum, that come from other parts of the world. In addition to these, we get many less essential imports from both Latin America and Asia, so that our imports from both of these continents are far in excess of our exports to them.

All Latin American countries are essentially our economic Allies in this war, whether they have entered the war against the Central Powers or not.

Latin-American Exports Increasing

Fortunately our exports to Latin America are increasing, notwithstanding the war. Julius Klein, of the Bureau of Foreign and Domestic Commerce, cited statistics showing that in the last 8 months our exports to those countries have doubled in value compared with the corresponding 8 months, 2 years ago. This trade growth, in spite of the submarine menace and ship shortage, augurs well for our continuing our hold on raw materials from those 21 Latin American nations, and also augurs favorably for a great increase of trade with those nations when we get floating those merchant ships now being built.

It was the consensus of opinion of all the convention delegates that retention of our foreign trade is the one big problem ahead for us. Today the paramount problem is not to obtain this trade but to hold it.

Although we must get supplies of raw materials for the war, we must also have them after the war. We cannot retain our manufacturing status without them.

Already all of the European nations have under way plans to re-establish themselves in their old foreign trade circles. Germany has every shipyard not needed for the production of navy vessels working on merchant ships with which she hopes to regain the trade she has lost during the war.

England's Plans Already Made

It has been previously told in these columns how more than a year ago Great Britain established her Ministry of Reconstruction and how she now has 87 different commissions working for post-war trade. She is making a complete survey of the raw material supply not only of her own dominions but of the entire world. She is laying plans for the conservation of those that are within her own dominions. She has established special arrangements with Italy and with France. She has organized a $50,000,000 corporation to assist in financing enterprises in foreign fields, which, due to the speculative nature of the enterprises, it would be difficult to finance through conventional banking channels.

The opinion of the convention was that Great Britain is not acting selfishly in this work, but is only doing what we as a nation would have to do were we in her place. She has made up her mind that never again will she permit an enemy of democracy and civilization to store up fabulous stocks of raw materials to carry on a war, such as the Central Powers were allowed to store up.

Unfortunately the United States at present has given no thought to a policy of reconstruction following the war, but the convention felt that this is necessary. It was recommended that the program of Great Britain be followed and that there be created a cabinet position that would have complete direction of this all-essential work.

It was also the opinion of the convention that the War Trade Board is using the utmost care in the licensing and control of exports and imports, and that nothing radical will be done by this board that will needlessly injure any industries. We must permit the export to foreign lands of what they require, otherwise we will become a debtor nation to them and will not have as strong a hold on their raw materials as is necessary.

The address of Mr. Patchin on essential and less essential products in foreign trade is worth noting. In short Mr. Patchin said:

Essential and Non-Essential Products

"In war everything that produces to the welfare of the nation is essential. As to what is essential or less essential in foreign trade can be determined by a similar line of reasoning as to what is essential or less essential in our domestic industries. Some so-called less essential industries in North America are needed in South America to pay for the goods that Latin America sells us.

"Today our most essential business is between the United States and Europe, but outside of Europe the two greatest fields of foreign trade are Latin America and Asia. What are our foreign trade relations with Latin America that will assist in winning the war? Today Argentina and Chile have not entered the war, whereas Brazil and Cuba have. The Germans today fear the establishment of a union between South America and North America most of all. In South America, many Germans are leaving countries that have declared war against the Central Powers and are locating in other countries which have not taken such a stand.

"All Latin American countries are economically our Allies in this war, and it is part of our duty to convince them of this. The nitrate from Chile is essential to our success in the war. In turn Chile requires our manufactured products. We require jute from Asia to make the sand-bags that we are using in the trenches in France.

Imports That Are Essential

"The essential character of imports in war times should be determined by the necessity of the domestic industry for which these imports are intended. We must obtain those materials that are indispensable in the prosecution of the war. It is possible that if the war goes on three years longer, we may require from Latin America and Asia certain manufactured goods which those countries are developing. In Chile the number of industrial manufacturing establishments has doubled since 1913.

"The value of imports from Latin America has always exceeded the value of our exports. We have always owed Brazil more for coffee, rubber and manganese than she took from us in merchandise. Latin American countries are now creditor nations of both Europe and the United States. Many changes are taking place in these countries since the war as compared with years previous to the war. An example is that a week ago Argentina made a loan to England. This is most unusual, as England has approximately $5,000,000,000 invested in that country."

In a paper prepared by John N. Willys to show what the automobile industry has done to assist in the war as well as to develop our national foreign trade, it was shown that in 1917 our automobile exports, including trucks and parts, practically equalled the entire exports of all agricultural machinery, plus the export of railroad locomotives and cars, plus the export of electrical machinery and apparatus. In 1917 we exported 65,792 automobiles and 14,347 motor trucks, the biggest proportion of the latter going to the warring nations. This represented a trade of more than $88,000,000, which would have been greater had there not been embargoes in practically all the countries in Europe preventing shipments.

The export of automobiles represents an important contribution to the prosperity of American labor and the maintenance of our exchange with other nations. Our automobiles are sent to Chile in exchange for nitrates used for the manufacture of explosives and fertilizers. We sell them to Argentina and get back beef, hides and grain. We send them to Brazil and the Straits Settlements in exchange for rubber, coffee, manganese and other war essentials.

The automobile industry with its great capacity for production has supplied the Allied armies with motor transport trucks, officers' cars, ambulances, tractors for field guns, tanks, farm tractors, special vehicles for airplant and balloon service, automobile kitchens, shoe repair shops, dental trucks, operating trucks, in short every kind of motor apparatus needed in the war.

In addition, the industry has undertaken great war contracts, aggregating $60,000,000 for other war necessities, such as airplane engines, airplanes, submarine chasers, naval guns, gun recoil checks, artillery wheels, shells, and other munitions.

It was calculated last year that the armies on all fronts were using more than 300,000 motor vehicles. During the first 3 years of the war the United States exported 45,308 motor trucks to England, France and Russia. Nearly all of these were for war purposes.

Had it not been for motor trucks, it would have been impossible to have built army cantonments in this country in less than 6 months, whereas they were built in 3 months. Trucks were used for building roads in the cantonments as well as moving materials.

During the last three years, the exports of motor vehicles have been as follows:

Year	Cars	Trucks
1915	41,864	22,094
1916	61,922	18,921
1917	65,792	14,347

If we add automobile engines, tires and parts, the total exports of the industry last year amounted to more than $140,000,000.

There are approximately 500,000 motor trucks operating in this country. Some conception of what these trucks can accomplish in freight movement follows: These 500,000 trucks have an average capacity of 2-ton loads, and can easily average 50 miles per day. Thus they have a combined capacity of 50,000,000 ton-miles daily, or a capacity each year of 15,000,000,000 ton-miles. If all shipments originating within a distance of 25 miles of the centers of large cities were handled by motor truck, thus making deliveries direct to consignee, the railroad freight houses would be relieved of that miscellaneous small freight that now causes so much terminal congestion.

Our Foreign Trade Duty

Conclusions of Cincinnati Convention Regarding Our Immediate Plans

CINCINNATI, OHIO, April 18—The Fifth National Foreign Trade Convention which closed here this morning—and which was attended by more than 900 delegates representing leading industrial firms and organizations of the country—was one of the most interesting conventions yet held, and every session, from beginning to end, was attended by a greater number than heretofore.

This attendance as well as the close attention to every address indicated the stronger hold that foreign trade has taken on the people of the country after a year of war.

Everyone seemed to have experienced a change of heart with regard to foreign trade as compared with the convention held in Pittsburgh a year ago which took place a week before the declaration of war. At that time too many firms looked upon foreign trade as an outlet for surplus stock. To-day things are different, and the majority look upon foreign trade as essential to our national existence.

Every session of the present convention has demonstrated the fact that to win this war the allies must have great quantities of raw materials. These are necessary for the munitions of war as well as the sustenance of the people.

The convention adopted for its motto the apt phrase: "The part of foreign trade in winning the war," and the conclusions of the convention which were agreed upon at its close this morning established the fact that every step in our foreign trade must have in mind this aspect of winning the war. That is the dominant thought underlying every foreign trade movement to-day.

The opinions of the convention emphasize the fact that our foreign trade must be maintained throughout the war for two reasons:

First—We must maintain this trade to assure ourselves adequate supplies of raw materials for war needs and for home consumption.

Second—We must maintain our foreign trade to retain our financial standing among the nations of the world.

In the control of imports and exports under the War Trade Board, the one thought is to conserve all tonnage for North Atlantic trade, and only restrict imports and exports necessary and imperative to such conservation. No restrictions are being placed on such trade without carefully examining each case. In granting permission to export as well as to import, preference must be given to those commodities essential in the war.

In connection with the building of our merchant marine, it is essential to develop the southern ports of the country because the congestion in the Atlantic ports is at present an impediment to ocean traffic.

The passing of the Webb-Pomerene Bill and its approval by the President on April 10 is highly satisfactory, as it permits co-operation in foreign trade which has been impossible heretofore in America. At the same time Germany has practically made it mandatory on her organizations to concentrate and co-operate in foreign trade, and the government has stood back of the merchant with all necessary finances and protection.

At the same time the United Kingdom has encouraged co-operation, and the government has assisted in the development of foreign trade. Greatly increasing numbers of firms must enter into the foreign trade of America if the volume of trade is to be equal to the volume of imports we require from foreign countries.

For the better development of our foreign trade greater educational attention on the part of our schools and universities must be given to the preparation of young men for foreign trade. Special attention must be given to those languages essential for a proper carrying out of foreign trade. If our foreign trade is to develop as much as that of other countries, more of our citizens must take up residence in foreign lands and give their personal attention to our interests there, a policy followed by Great Britain, France and Germany.

Congress should adopt a policy of a flexible and bargaining tariff, so that the future of our foreign trade should follow lines of least resistance.

The National Foreign Trade Council should make a careful survey of the raw material supply of the world, so that America will be able to protect herself and her industries after the war.

While these were the general conclusions with regard to the broad policy of foreign trade after the war, there were many additional conclusions which were agreed upon, not by the convention as a whole, but by eight different groups into which the convention was divided during half of its sessions. These groups considered different aspects of foreign trade, and were generally attended by from 150 to 400 delegates each. Exactly 50 per cent of the total time of the convention was given over to these group meetings and the remaining 50 per cent to general sessions of the convention.

Group I.—Banking Facilities for Foreign Trade and Investment.

This group favored a more general use of trade acceptances. It favored the enactment of the Glass Bill into law. Economic conditions that will confront the country after the war must get quick attention, as is being done in Great Britain, France, Italy as well as the Central Powers. The group favored the appointment of a cabinet minister to supervise this general problem of economic reconstruction following the war. It further recommended the appointment of a committee to consider the many fundamental problems that must be solved before our foreign trade can be on a sound financial basis.

Group II.—Initiatory Problems in Foreign Trading.

The conclusions of this group were that it is necessary in foreign trade first to make a careful study of the country, then a careful study of the people and their characteristics, next the different seasons and lastly it is necessary to differentiate among various sections of foreign countries where it is necessary to handle foreign trade in different ways. American manufacturers must be ready to give credit to buyers in establishing foreign trade. The opinion was that where a small sum such as $10,000 is the only appropriation for beginning foreign trade, such a firm had better place the foreign trade in the hands of some exporter rather than attempt to handle the trade itself.

It must be realized generally that the cost of carrying on foreign trade is higher than that of carrying on domestic trade. It is essential that if we expect to hold our foreign trade after the war, we must operate with high ideals and take the highest pride in the class of goods exported, and also in methods of exporting.

Group III.—Commercial Education for Foreign Trade.

It is essential that those carrying on our foreign trade shall be properly educated for the work, just as it has been found necessary and satisfactory in European countries.

Group IV.—Co-operation in Foreign Trade.

Heretofore America has had no policy with regard to co-operation in foreign trade, but the passing of the Webb Bill is a start in this movement. Germany has made co-operation and concentration of industries mandatory in many cases. Great Britain has encouraged voluntary co-operation and the government favorably assists in all such co-operation for foreign trade. America must adopt a definite policy in this work.

Group V.—Foreign Credits and Credit Information.

The extending of credits in foreign trade is essential. Greater care must be given to the investigation of foreign credits before sales are made, so that sales do not have to be cancelled after they are made. It is recommended that our consular service be extended so as to assist in supplying credit information.

Group VI.—Problems of the Smaller Manufacturer and Merchant in Export Trade.

It is recommended that some form of foreign insurance be recommended which will cover the credit of foreign firms buying goods. The American exporter should have his own manager caring for his foreign business rather than intrusting it to representatives of other countries.

Group VII.—Pacific Overseas Trade Extension.

The need of American-owned ships for Pacific trade is essential. At present Japan really controls the carrying of goods over the Pacific, and the country that controls ships generally controls the trade. The Orient is one of the greatest undeveloped markets of the world and our government should give the same protection to its business men in getting their share of this market that European governments have afforded their business organizations.

Group VIII.—Latin American Trade Relations.

No report was furnished from this group, although it held sessions which continued throughout an entire afternoon.

Oil Interests Have Learned the Value of Co-operation

CINCINNATI, April 18—The oil interests of this country are prepared to give our Allies and our American Expeditionary Force in France during this year every gallon of gasoline, or kerosene and of lubricating oil that is needed.

In addition, according to A. C. Bedford, of the Standard Oil Co., and also of the Council of National Defense, Washington, there will be sufficient of all three of these for our home needs during the year and it is hoped to be able to supply liberally the many neutral nations that have been depending on us for petroleum products since the early days of the war.

All of the United States oil men have during the past year of war dropped their individual activities and co-operated to meet every emergency. As a result our allies this year will have every gallon of gasoline, kerosene and lubricating oil necessary for the war, and there will be sufficient for domestic use.

Production and refining have steadily increased during the past year so that America has produced more crude oil than ever before in her history. The production of crude oil has increased from 265,000,000 bbl. in 1914 to 328,000,000 bbl. in 1917. The refinery capacity of America has increased from 900,000 bbl. a day in 1914 to more than 1,000,000 bbl. in 1917. American refineries in 1917 consumed 380,000,000 bbl. of crude oil.

The amount of gasoline that it has been necessary to export due to the war has increased enormously since 1914. In 1913 we exported 29,000,000 gal. of gasoline to our present allies, and in 1917 we exported 300,000,000 gal. to them.

In the same period the exports of lubricating oil have also increased enormously. In 1913 we exported 103,000,000 gal. In 1917 we exported over 200,000,000 or nearly double that amount.

Exports of naphtha and gasoline have increased with tremendous strides.

The greatest handicap in connection with the exporting of gasoline, lubricating oils and kerosene is the shortage of tank ships to care for the trade. America had very few tank steamers when the war broke out, and practically all of the petroleum products were carried in tankers of British, German, Dutch or Norwegian register. After the outbreak of the war, a number of German tankers were transferred to the American flag, and these to-day constitute an important part of the American fleet. A proportion of the British fleet of tank steamers was commandeered by the British government for its requirements. This shortage of tankers has made it impossible to supply all of the demands of the Allies and also of the neutral nations.

In 1914 the gross tanker tonnage flying the American flag was 278,753 tons. The building program has steadily

expanded, so that to-day our tanker tonnage is 1,106,754, or practically 5 times that of 1914.

"Owing to the shortage of tonnage," Mr. Bedford said, "neutral countries have been deprived of supplies which ordinarily they would have a right to expect. We are fighting the fight for neutrals as well as ourselves, and it is from no lack of sympathy or disregard of their rights that they have not received supplies they were receiving previous to our entering the war. It is because those shipments are needed elsewhere, in order to safeguard the common cause, to protect the national life and the freedom of those neutrals, at the same time that we are protecting our own.

"It is a fortunate situation that the great increase in petroleum production has occurred with less increase in price than has obtained in any other industry in the country. There have been advances due to the higher cost of materials and labor, but these advances are by no means comparable with the increases that have taken place in other industries.

"The great war lesson to the oil trade is what the individual operators have been taught by virtue of co-operation. The value of pulling-together has proved absolutely indispensable in this war, and it is the lesson that we Americans in particular must keep clearly in mind both now and when we again face the problems of peace."

History of the War Trade Board

THE history of the War Trade Board dates from June, 1917, when the passing of the Espionage Act gave the President the control and direction of all exports. These powers were delegated to the War Trade Board. Later when the Trading with the Enemy Act was passed and gave the President control of imports, this power was also delegated to the War Trade Board, and in the last few months 43,042 import licenses have been handled.

One of the acts accomplished by the War Trade Board which shows how it has been helping in the conduct of the war was the stopping of shipments of 15,000,000 tons of oil cake, which was to have been exported to many of the countries bordering on Germany. This would have literally produced tons of farm produce that would have flowed into Germany. Retaining it in this country aided in our own food production, and also aided in stabilizing our prices.

Conserving Shipping Space

Another example of how the War Trade Board has acted to conserve North Atlantic tonnage is with regard to wheat shipments to Italy. We formerly exported 50,000,000 bushels of wheat to Italy, which was manufactured there into macaroni and spaghetti and then returned to us. This double shipping has been stopped. The same applies to 4,500,000 lb. of mushrooms and 16,500,000 lb. of dates. The countries producing these must now eat them to conserve shipping space.

Ocean tonnage has constantly been conserved by restricting the movement of less essential products and luxuries. In connection with the export of steel plates for shipbuilding, the Board deferred the shipment of such plates to Japan, although they were sold before our entrance into the war. The Japanese government was asked if it would return these plates in ships, which she agreed to do. In this way 553,000 tons of shipping have been added. Of this amount, 155,000 tons are now chartered, and the remainder will be completed within the year.

The War Trade Board was delegated to handle the question of taking over the 450,000 tons of Dutch ships that lay in New York harbor. A plan of rationing Holland was agreed upon in return for taking over the boats and using them in safe waters. At this stage in the proceedings it was found that Holland had very little to say in the negotiations, but that Germany was really doing the dictating.

One of the big acts of the War Trade Board has been to reduce the flow of food into Germany through such neutrals adjacent to Germany as Norway, Sweden, Denmark and Holland. It was the flow of food and raw materials through these countries that kept German industries running. After we entered the war these countries were notified that this must stop, and as a result a very acute situation was created in Germany until the unfortunate situation when she was again able to secure supplies from that source. The War Trade Board has secured nearly 2,000,000 tons of shipping from Norway, notwithstanding the fact that that country had previously lost nearly 1,000,000 tons as a result of German submarine warfare.

The Bureau of Exports is handling 9000 applications for licenses a day. Approximately 90 per cent of these are being granted. Licensing exports is purely to keep supplies from the enemy, as well as to conserve other supplies and shipping.

Great Britain and France have both found it necessary to control the supplies of such products as tin, jute, wool, rubber, chrome, etc. When the United States entered the war, these countries naturally wished her to use the same regulation over these and other materials as they had exercised.

In March, the Bureau of Imports issued licenses for imports to the value of $573,000,000, or a daily average of $20,000,000.

Steel Production of the Belligerent Nations

IN a paper read by Ernest F. Lange before the Manchester Association of Engineers, at a recent meeting, the author summarized the official statistics comparing the steel production of the Entente Allies and that of the Central Powers. He said that the largest annual outputs made by the various countries before the war, in terms of steel ingots and castings, reached a total of about 75,500,000 gross tons, divided approximately as follows: Central Powers—Germany, Luxembourg, Austria and Herzegovina, 28.2 per cent; Entente Allies—England, France, Russia, Belgium, Canada and India, 27.6 per cent; Neutrals—United States, Italy, Sweden, Japan and China, 44.2 per cent. Changes during the first year of the war included the transfer of Japan and Italy from the neutrals to the Entente Allies, and occupation by Germany of Belgium, together with territory on which was situated nearly three-fourths of the French steel-making industry. The Entente Allies now lost the Russian production, some 5,000,000 tons, or 6.6 per cent of the total pre-war production. To what extent this might become available for the enemy it was impossible at present to foretell.

It was hardly surprising that Germany, with its population increasing before the war at the rate of one million yearly, and faced with the possibility of her own visible supply of home iron ore being exhausted in fifty years, appeared determined to retain her hold upon the great Briey ore basin. Underlying all the sentimental reasons for the possession of Alsace-Lorraine was the fact of the immense extent of its ore reserves.

On entering the war the United States occupied a peculiar position as to steel. The European countries had diverted nearly their entire steel output to the prosecution of the war, but the output of all belligerents was materially less than the present output of the United States, even though the latter was somewhat restricted, as compared with its capacity. Thus the United States could prosecute the war vigorously and still have much steel left for industries catering to private needs.

Germany and Austria had had no occasion to increase their steel output by new construction, as they had had capacity in occupied territory to draw upon. Furthermore, owing to the stoppage of their export trade, the production of Germany was said to be 5,000,000 tons less than in 1913. France had added but little. England had added nearly 4,000,000 tons to her ingot capacity, with a further 1,000,000 tons in prospect. The United States now had an ingot capacity of 50,000,000 tons or more, and was producing at the rate of 45,000,000 tons, against an output in 1913 of 32,300,000 from a capacity of 35,000,000 tons or thereabouts.

Coffin Resigns From Aircraft Board; Refuses Post in Reorganization

John D. Ryan, Copper King, To Head Aircraft Activities

Complete Revision to Take Place—Aircraft to Be Separate from Signal Corps—General Kenley, from Pershing's Staff, to Take Charge of All Training

By Allen S. Sinsheimer

WASHINGTON, D. C., April 24.—While no definite announcement has been made regarding the revised airplane program, it is known that Howard E. Coffin will resign as chairman of the Aircraft Production Board, and that a complete reorganization of airplane activities will take place.

John D. Ryan, president of the Anaconda Copper Co., and who has been prominent in Red Cross activities in France, has been slated as administrator of aircraft activities. He has agreed to accept the position. Mr. Coffin was offered a position in connection with the revamped aircraft activities but has refused to accept it. Mr. Coffin has been ill in Washington for some days.

Under the reorganization, aircraft activities are being entirely separated from the Signal Corps. Brig. Gen. Kenley is returning from Gen. Pershing's organization in France to assume complete charge of aviation training in this country.

Mr. Ryan is closely associated with Edward R. Stettinius, Second Assistant Secretary of War, and also with Bernard M. Baruch, chairman of the War Industries Board. While not actively connected in business organization with the Morgan interests, he has always been very friendly with that group of financiers.

President Wilson has not yet given out the Marshall airplane report which has been expected for several weeks, and which may not be given out until the complete airplane reorganization has been effected. It is known that the President has gone through the Marshall report very carefully with Mr. Stettinius, with whom he has discussed the complete plans for the reorganization of the administration.

Major-General George O. Squier, who has been chief signal officer of the army, and head of the Signal Corps, which has controlled aviation, is displaced as head of the aviation section by General Kenley. In future, General Squier will confine his activities to what is known as the administration of signals; in other words, this representing the separation of the aircraft activities from the Signal Corps.

William C. Potter, who has been active with the Aircraft Production Board, and who is now head of the equipment division, will continue to have charge of this aspect of aviation work.

While the special aviation report of H. Snowden Marshall, who visited the aviation factories, at the request of President Wilson, has not been made public, it is understood that the President has followed the recommendations of the board in separating aircraft production from the Signal Corps, and in also separating aircraft production from aircraft operation. It was hoped that the entire aircraft administration would have been placed under one man, but according to the announcement this has not been done, as production will be under Mr. Ryan, and training, etc., under General Kenley. This new arrangement should result in smoother operation and greater efficiency.

Mr. Coffin has lent his entire efforts to the reorganization program, even going so far as

John D. Ryan

MR. RYAN is president of the Anaconda Copper Mining Co. and has been a prominent figure in the copper field since 1907. As head, first of the Amalgamated Copper Co., where he succeeded H. H. Rogers, and later as president of the Anaconda company, which absorbed the Amalgamated in 1914, he has been responsible for the management of the largest single copper unit in the industry. Mr. Ryan was born in Houghton, Mich., in 1864. His first intimate contact with the government was just before the United States entered the war, when copper was scarce and was selling a 30 cents per lb. Through conferences with Bernard A. Baruch and large copper producers, Mr. Ryan succeeded in obtaining for the government a large supply of copper at 16⅔ cents a pound. Later he went to Washington as chairman of a sub-committee of the War Industries Board and in June of last year became chief assistant to Henry P. Davison, head of the Red Cross work.

to accompany Mr. Marshall in his visits at the factories. It has been known for many months that Mr. Coffin has favored a policy of greater publicity on the aircraft program, but that he has constantly been obstructed in this work. For several months he has solicited the widest publicity to the airplane delay, and has asked for criticisms that would result in a more constructive policy. The opposition in the past which has thwarted Mr. Coffin in his plans should be overcome under the reform policy.

In those aircraft factories engaged in the production of engines, and also in the manufacture of fuselages, wings, etc., production is not increasing as rapidly as it should, although increases are taking place. The production of complete planes has been held up due to the lack of specific instructions from the Signal Corps on the complete equipment of the planes; that is, with reference to matters relating to machine-gun mountings, etc. It is only within the last 10 days that the final approved equipment has been apparently definitely settled, thereby giving the factories the right of way to get into production on complete machines. Production has been badly delayed in the last two months because of this.

There is no delay in the factories at present due to the shortage of spruce; in fact, trainload shipments are arriving from the West on schedule, and the factories have satisfactory supplies on hand. We are giving every material aid to England in the supplying of spruce for her airplanes.

Flying with Liberty engines in De Haviland planes is increasing at the flying fields. The Liberty engine is giving the greatest satisfaction, as a performer. Reports have arrived from Europe showing that the engine is producing great horsepower in European tests.

Many Reasons for Delay

Each week brings to light different reasons for the delay in the production of the engine, as well as in the production of planes. Originally the engine was intended as a 330-hp. one. Later, when its power ran up over 400 hp. it called for greater cooling facilities. This necessitated more radiator capacity, and until this was furnished some of the engines flying had difficulties with cooling, which, however, were only temporary. It was unfortunate that as soon as the increased power output was known that the necessary orders for changes in radiator capacity were not put through so that the temporary heating delays would have been avoided.

During the week Congressman Kelly of Michigan made an address in Congress dealing with the aviation engine in which this cooling was referred to. He declared that 106 changes of this nature were made by experts in connection with the engine. As previously mentioned, some of the manufacturers believe it would have been better to have kept the Liberty engine as a 330-hp. unit and pushed it into production, rather than developing it to a 450-hp. unit, which has called for a great many changes in engine parts due to this greatly increased power output.

It was shown in the discussion in Congress that the largest airplanes we are making cost $30,000, excluding the two engines to be installed which cost $6,000 each, making the total cost $42,000 per machine. Recent changes abroad now necessitate making still larger planes than these.

Col. E. A. Deeds was quoted as saying that there is not an aviator abroad in the American forces who has not machines with which to fly and that there will not be one abroad who will not have machines when he needs them. They are being equipped with foreign machines made under contract with France, which are being provided by engines shipped from this country. Colonel Deeds also was reported to have said that England has made a request for a given number of Liberty engines by July 1 and according to production arrangements in this country, will not only receive the number asked for but many additional ones.

Several of the Congressmen were very much disturbed about the fact that the navy as well as the army, was suffering from a delay in the production of Liberty engines and considerable discussion was required to make plain the fact that Liberty engines are being supplied to both the army and navy by the same manufacturers.

It was stated that Weather Bureau reports indicate that flyers can fly longer per day on an average at San Diego, Cal., where the Government has a field of 1200 acres, than any place in the United States. There was criticism made because the San Diego property was not so fully developed as fields at Miami, Fla., and at Key West. It was said that Government appropriations have been extravagantly used for the erection of buildings and that we have a million dollars worth of buildings on $80,000 worth of land.

Ninety-five per cent of the $640,000,000 already appropriated for airplanes, was stated to have been either expended or obligated, entirely for the army.

Congressman Oliver of Alabama answering the criticism directed toward naval aviation, stated: "I do not think anyone is satisfied with the progress aviation has made either in the navy or in the army, but I think the officers directing the aviation department of the navy, are capable and industrious and have put forth every possible effort to hurry up construction. They simply could not accomplish the impossible and their disappointment is as keen as ours. The navy has very recently built near Philadelphia, a factory for the construction of airplanes and has already turned out more than three, and the production will increase from this time on. That factory was built in an incredibly short time. It has been in operation only a comparatively short time and they are now largely expanding this plant. Contracts have been let in different parts of the country for the different parts of the planes which will be assembled at this factory. The naval officers recognize that airplane construction is about 60 days behind the estimate made last August.

It was shown that we have a sufficient number of pilots, mechanics and other trained officers for advanced training at all of our completed foreign stations and that we are shipping more than twenty service planes now with prospects for increasing shipments in the near future. The naval aviation service which had 320 officers and men when the war started, now has more than 17,000 in the organization.

Senator James E. Watson of Indiana, after making an investigation of the Nordyke & Marmon factory at Indianapolis, last week, stated in an interview here, that the new building erected especially for airplane production, was remarkable for its completeness.

Nordyke & Marmon, he added, originally accepted an order for 2500 Hall-Scott airplane engines for use in training planes. The company finished 1000 of these, shipping the last one early in April, when it had to stop this work because of new Liberty engine contracts urged upon it by the War Department. Stopping at this time was a considerable expense to the concern since the cost of tooling and getting into production could hardly be made upon the first 1000 engines, and new tooling machines are necessary for the new Liberty engine contracts, but the company, actuated by patriotism, accepted the War Department recommendation, cancelled the remaining Hall-Scott orders and is concentrating on the Liberty engine, regardless of cost.

Mr. Coffin, on his resignation as chairman of the Aircraft Production Board, has taken a very favorable view of the re-organization and thinks it a logical step. He has issued the following statement:

"The appointment of a single individual with definite and adequate power to deal with all aspects of production is a logical step. It is necessary to get away from any question of a division of responsibility either in fact or in the public mind.

"The Aircraft Board remains as since its creation in October, but under this new arrangement the chairman of the board becomes also the supreme executive agent.

"A more proper result both in power of execution and the responsibility must be expected. The method of Mr. Ryan's appointment will seem to accomplish this result."

Manufacture of Worm Gear and Assembly Methods Factors in Fordson Tractor Success

Casting Teeth in Worm Wheel Blank Makes Big Cut in Hobbing Time—Assembly Simple Process Requiring Short Time

BESIDES the 200-lb. casting, the manufacture of which was described in detail in AUTOMOTIVE INDUSTRIES for April 11, the most important part of the production of the Fordson tractor is the manufacture of the worm gear and the assembly.

As has been stated in former descriptive articles, the Fordson tractor is driven by an underhung worm. This worm gear and the entire transmission set are mounted within the large casting. Henry Ford & Son has accomplished some feats in connection with the worm gear which are new in the annals of manufacture. For example, the worm wheel, an aluminum bronze casting, which generally requires from 50 to 60 minutes, is being turned out at the rate of one in 8 minutes, and this is not as rapid as it can be turned out with production pushed.

The assembly is also notable in that the transmission units drop quickly into place without the hand fitting often required in this work.

There are four operations between the blank and the completed worm wheel. On the worm itself, which is a vanadium steel forging, there are twelve operations between the blank and the finished product. Thus the worm and gear are turned out in a total of sixteen operations, many of which are unique in worm gear manufacture and which are responsible to some degree for the relatively low cost of manufacture of this machine.

One of the biggest secrets in connection with the successful manufacture of the worm gear is the blank. This is shown in Fig. 1. It is different from other worm gear blanks in that the teeth are cast roughly in plate, thus saving fully three-quarters of an hour on the machining job as compared with the manufacture of the worm gear in other factories.

The first operation in the manufacture of the worm wheel is to face off the bolt hole surface which can be seen on the blank and which forms the internal annulus of the gear. An engine lathe faces fifty in 8 hours.

Fig. 1—Blank of the worm wheel. The unusual feature of this worm wheel is that the teeth are roughly cast to shape on the blank, eliminating a great part of the hobbing operation

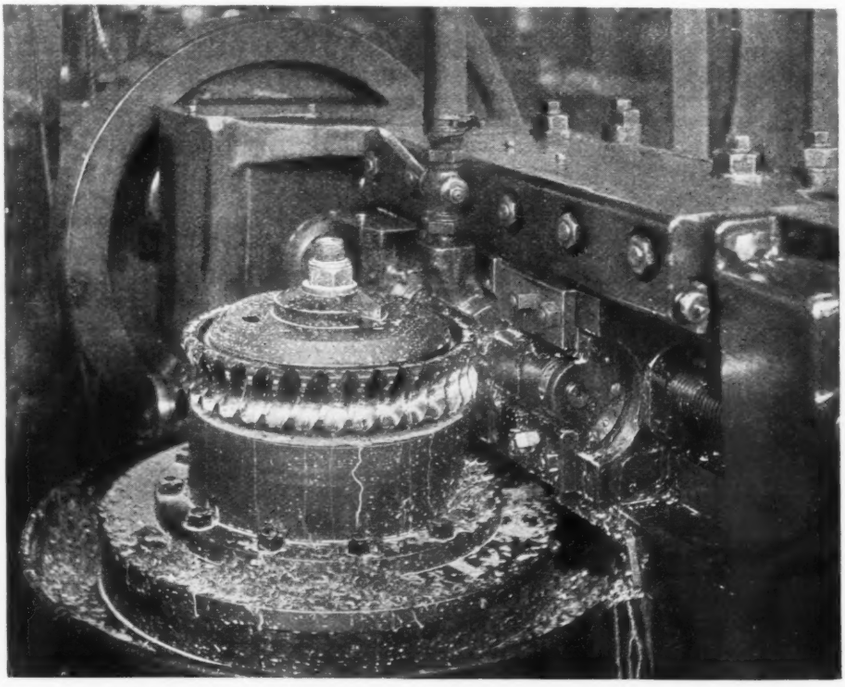


Fig. 2—Hobbing operation on the worm wheel. This is done on a Gould & Eberhardt worm gear generator, of which there are two in the Ford tractor factory. Each machine finishes the gear wheels complete. Limit on the cut is .010 in. and on the test the backlash must be held on a master worm within .020 to .030 in. Each machine is capable of turning out sixty in 8 hours

Stages in Assembling the Fordson Tractor

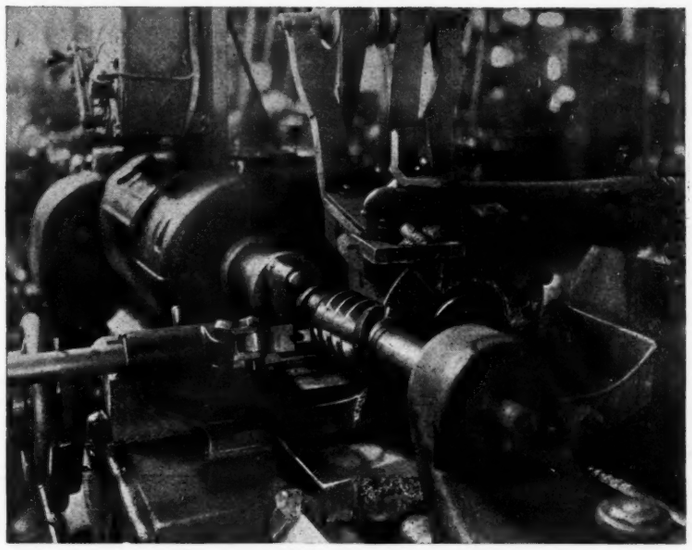


Fig. 3—Milling the worm. On this operation .010 to .015 in. of metal is left for grinding process. Milling is done on a Lees-Bradner thread miller. Capacity of machine is fifteen in 8 hours and there are six of these machines in the factory

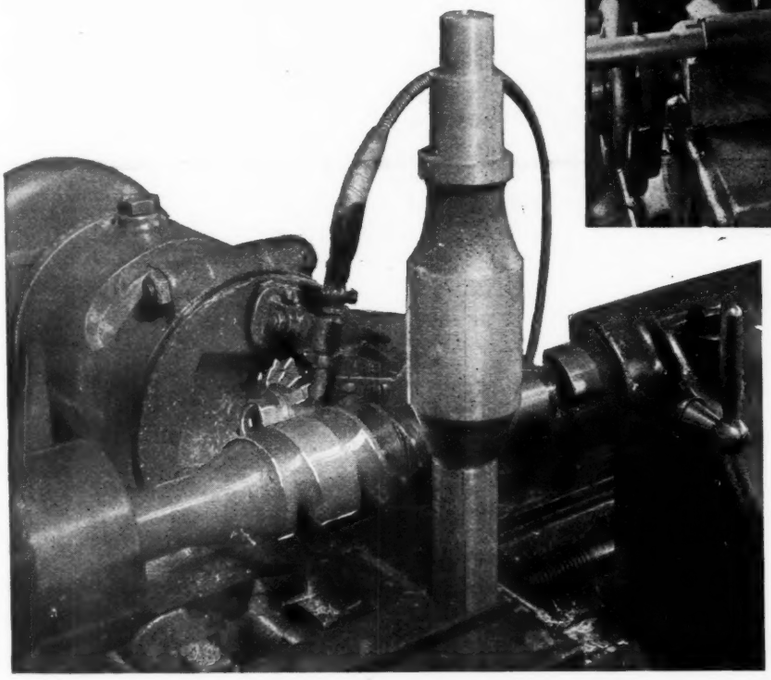


Fig. 4—Grinding the worm. This is a new machine which is being pushed into production after a period of trial. The grinding wheel is dressed to fit in the angle of the worm, and as will be noted the dressing tool for the grinder is directly on the machine. It is so arranged that it can dress both sides of the grinding wheel by turning it over

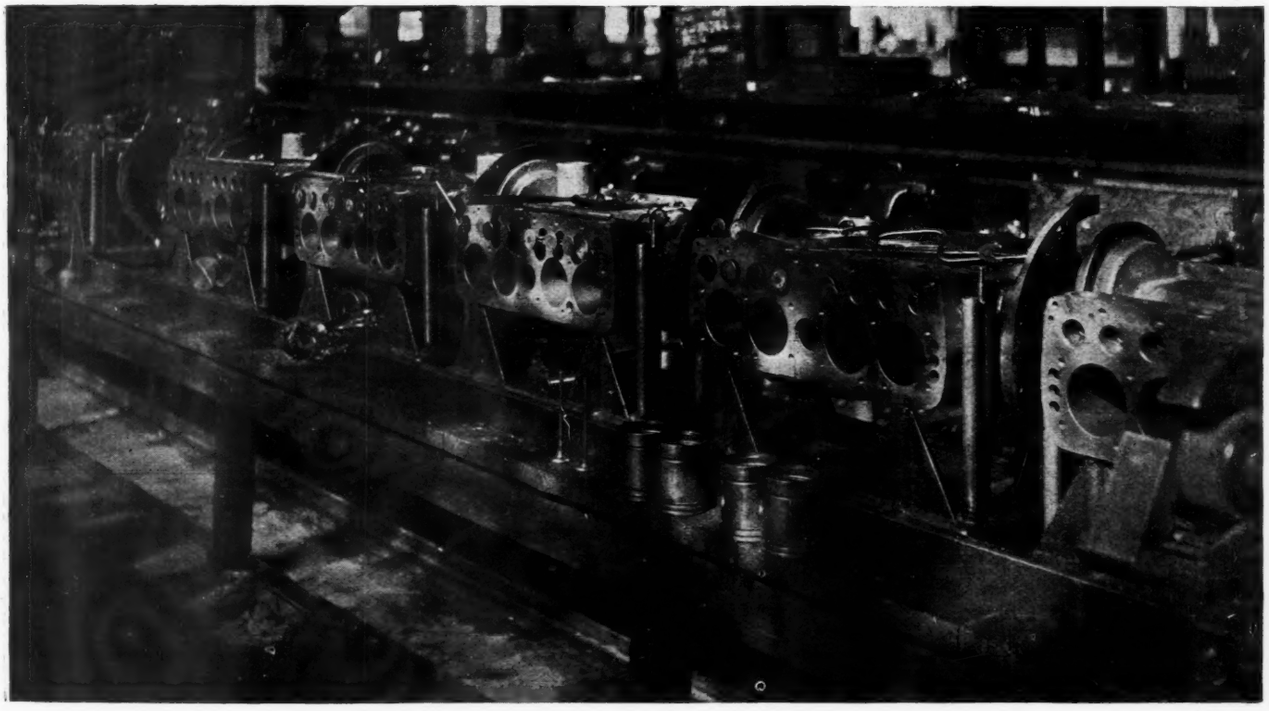


Fig. 5—Engine assembly, showing the first stages at the Ford tractor factory

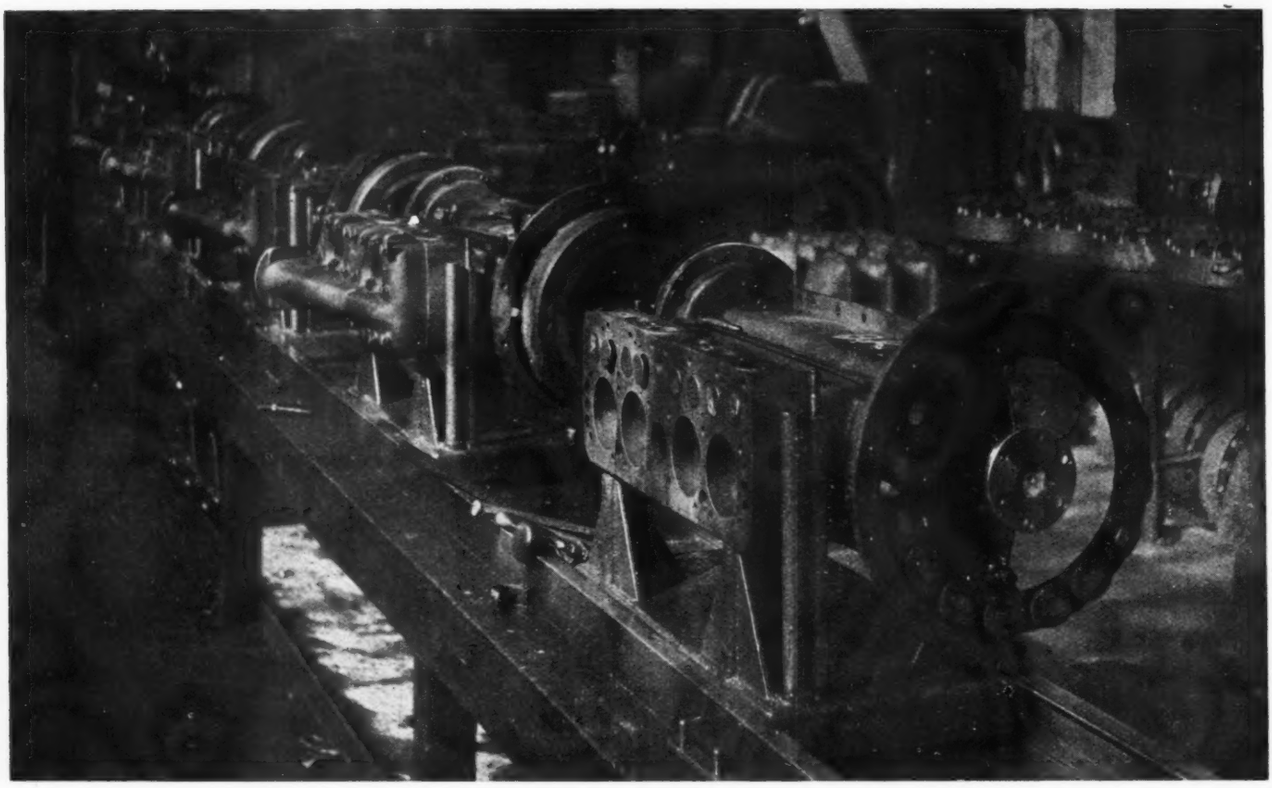


Fig. 6—Later stages of engine and magneto assembly at the Ford tractor factory

There are two machines on this job. The capacity is 100 in 8 hours or fully three times the present normal production, although, since production is gaining rapidly, this will not long be the case. As this facing operation is one which establishes the width of the inside of the gear, a limit of 0.002 in. is placed on the work.

The second operation on the worm wheel is to drill the twelve bolt holes indicated in Fig. 1 on the blank. These are drilled through the centers of the bosses, which can be seen on the inside of the gear. The holes are ½ in. in diameter and they are countersunk and reamed. This latter operation may be considered a separate one, as it is done on a different machine. The capacity of the machine doing the work is 100 in 8 hours. It is a Foote-Burte drill with multiple head of their own design for the drilling, and the reaming and countersinking are done on a Leland-Gifford sensitive drill press. The reaming is done first and then the change over to the countersinking tool can be quickly accomplished, as a patent chuck known as the Magic is used which requires but 1 second to make the change-over.

The next operation on the worm wheel is the real key to its manufacture. This is the generation of the gear teeth. The operation is shown in Fig. 2. The work is done on two especially built Gould & Eberhardt worm-gear generators. Each machine finishes the gear wheels.

Owing to the fact that the blank is roughly cast to form, the hobbing cutter on this machine has to take off very little metal and consequently the work is done rapidly. The machine has no difficulty in turning out sixty in 8 hours. The limit on the cut as measured on the pitch line of the worm gear is 0.010 in.

In checking up the gear a master worm is used and the backlash is measured between the worm and the gear by means of feeler gauges, and an allowable backlash of 0.020 to 0.030 in. is permitted. The speed of the hob on this machine is 73 r.p.m. and the pitch diameter of the hob 2.731 in., the outside diameter being 3.445 in., which will give an idea of a cutting speed.

The next operation on the wheel is to inspect it by means of a master worm. A machine accurately set up to bring the gear to the proper contact or mesh with the worm is utilized for the purpose and the worm wheel placed on a fixture and spun around. The master worm is coated with prussian blue and after the spinning operation backward and forward has been performed two or three times the worm wheel is inspected to see that it has a full bearing on every tooth.

Manufacture of Worm

The blank for the worm is a cylindrical drop forging with spindle ends. The material is 4-a vanadium steel and the forging is done at the Ford Motor Company's shop in Highland Park, Mich. The first operation on the worm is to cut it off to the proper length. This is done by an Ohio milling machine, which mills off both ends at once between parallel cutters, thus fixing the length, which is 18⅛ in. Capacity of this milling machine is 200 in 8 hours, so that it readily takes care of the entire production of the factory at the present time and also will for some time to come.

The second operation on the worm is to establish the centers or axis at each end. This is necessary in order to fix the accuracy of the turning operation. The worm is located by a centering chuck at each end and the axis is established by a countersinking or indentation at each end.

The third operation is to rough-turn the worm to the proper diameter, which is done on two Reed-Prentiss semi-automatic lathes. One machine does each end of the worm. The operation on the two machines requires 5 minutes. A surplus of 0.020 to 0.025 in. is left for grinding on this operation.

The teeth of the worm are now ready to be cut, and

this is done on a milling machine. The operation of milling the worm is shown in Fig. 3. The machine is a Lees-Bradner thread miller. It has a capacity of fifteen in 8 hours, and as there are six of these machines the factory has a capacity of ninety in 8 hours, or 270 in the 24-hour stretch.

As will be noticed from Fig. 3, the worm is a double-threaded type and the machine is just about ready to take the final cut on the second thread. The feed screw of the machine can be seen beneath the cutting operation, and in this work from 0.010 to 0.015 in. of metal is left for finish grinding. After the teeth are milled the worm is heat-treated and ready for the grinding operations.

The first grinding operation is on the surface of the bearing on Landis & Norton grinders to 0.0005-in. limit. The worm diameter is next ground and finally the worm teeth. This is another operation which is a new one and which is being watched very carefully. It is accomplished on two specially built worm grinders automatically operated, the grinding wheel moving at the proper rate of speed to grind both sides of one thread. As this is a double-threaded worm, the other tooth has to be reset by turning the worm around one-half revolution and then remeshing it with the grinding wheel.

The operation of grinding the worm is shown in Fig. 4. At the chuck end of the machine holding the worm a pin is indicated which is pulled out and allows the worm to be turned around one-half revolution for bringing the second thread into mesh with the grinding wheel.

The machine is so arranged that it travels along the surface of the room, grinding the face, and when it reaches the end it is thrown over by a cam, changes its direction and comes back and starts over again, continuing the grinding process.

Another feature of this machine is that the dressing apparatus for the grinding wheel is directly on the machine. This is an important feature, as the worm dresser is a diamond-pointed tool guided to dress the wheel to fit in the angle of the worm, which, of course, is essential in order to secure a good grinding job. The grinding tool can dress either side of the grinding wheel by turning it over. At the present time the time required on this grinding operation is seventeen in 8 hours. The time and limits are not accurately fixed on this work as yet, as it is new. It is expected to get up to forty in 8 hours on this operation.

The finishing operation on the worm is that of polishing, which is done on a new machine, this being a specially built buffer, in which a felt wheel meshes with the worm and by means of fine emery the face of the worm is smoothed to a mirror finish.

After this is done there are three other operations, none of which is different, however, than those carried on in other machine shops. The splining is accomplished on a Barber-Coleman spliner; the thread for the bearing nut is milled on a Pratt & Whitney threader and the cotter-pin hole is then drilled through the threaded portion in order to supply an anchor for the castellated nut used on this shaft.

The Assembly Work

As the Ford tractor is made up of two principal units, the engine and the transmission, the sub-assemblies of each proceed independently until the period of final assembly. The engine assembly does not differ materially from that in any engine manufacturing shop, the only exception being that since the Ford factory is in a period of transformation the assembly racks are of a nature which can be changed rapidly. That is, they can be moved about.

The first step in engine assembly can be seen in Fig. 5. It will be noted that the progressive steps are carried on in the regular manner, the only point of difference being the tray which travels along the inside of the two chan-

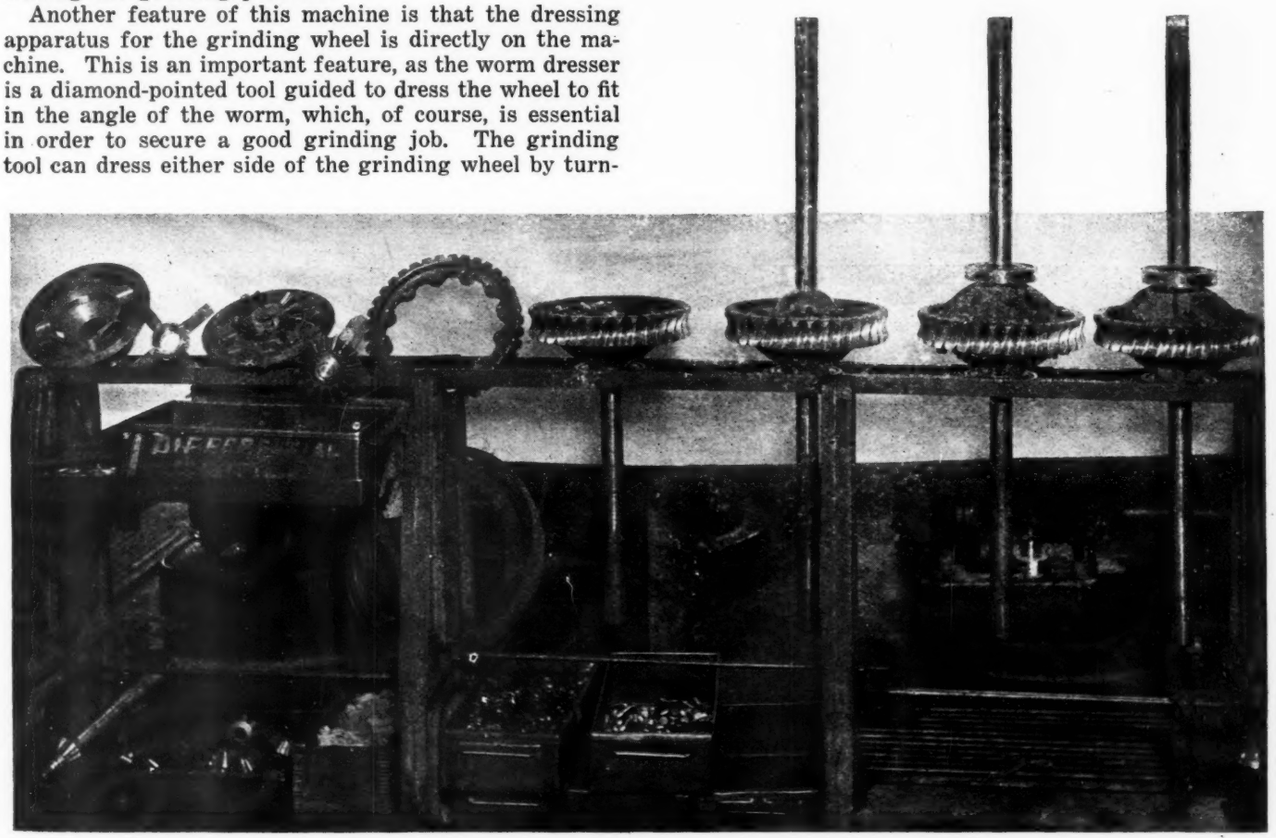


Fig. 7—Building up the differential assembly, showing to the left the housing, spider and pinions, the worm wheel, and finally the assembled unit, which is at the right

nels mounted upon the stand at a convenient height for the workman.

A further view of this stand toward the completion of the engine is shown in Fig. 6. It will be noted in this illustration that the magnetos are beginning to be assembled on the engine, and, looking into the background, the completed engines can be seen. There is a monorail system with a chain hoist above the assembly stand, allowing the workmen to place the heavy parts in position without any material manual labor.

The transmission assembly starts with the building up of the differential, as shown in Fig. 7. To the left of this illustration are shown the various units which enter into the differential, namely, the housing, spider and the pinions. These are rapidly put into position and the worm wheel which slips over the differential housing is then put in place. The other half of the differential with the axle shaft is then put on and the bearing pressed on by means of an arbor press. These few steps complete the differential assembly, which is handled very quickly.

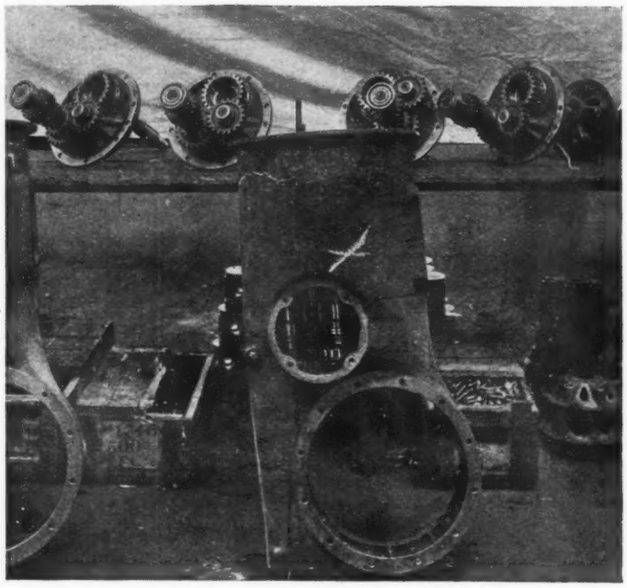


Fig. 8—Above—Gear set assembly, which drops into position against the transmission plate face in the large casting, which forms the body and frame of the tractor

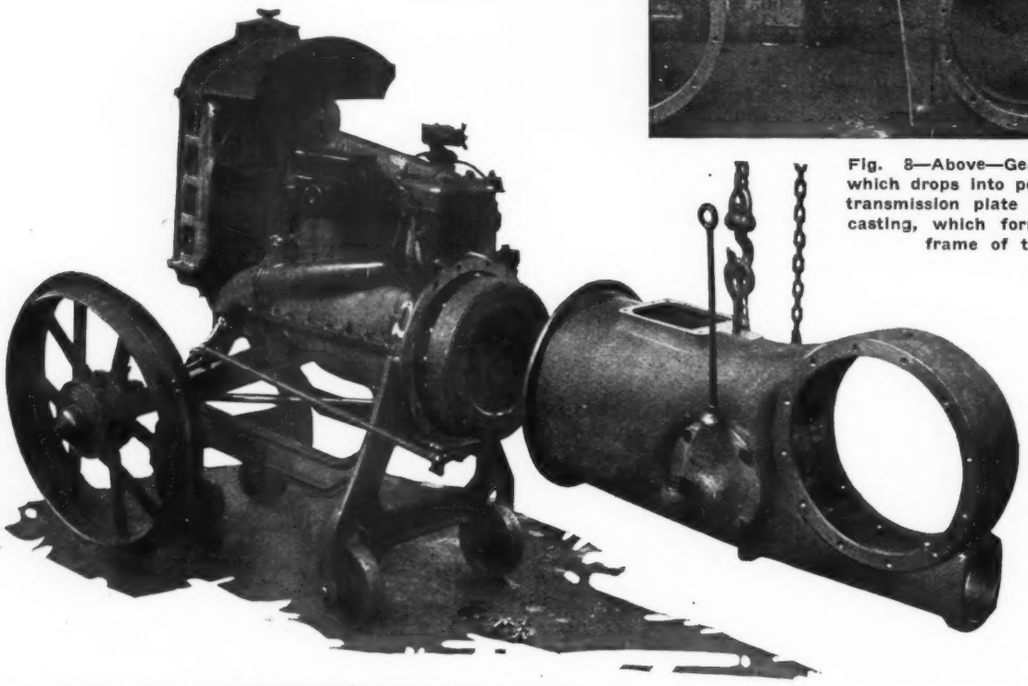


Fig. 9—Left—A step in the final assembly brings together the two main units, the engine and the transmission housing casting

Fig. 10—A glimpse of the progressive stages of the final assembly. The tractors in the foreground are completely finished and ready to run out the door, which is just behind the photographer. In the background are shown the tractors in the early stages of final assembly

When the clutch is in place in this housing, the housing is bolted against the motor, which has already been assembled to the front axle and the radiator placed in position. This operation is indicated in Fig. 9 and the details are apparent from the photograph. The engines, together with the front axle and radiator, are carried on a roller carrier, while the large casting is brought up by the monorail system and bolted into place.

Following this, the differential assembly is slipped into position and the axle completely assembled. The worm can be rotated into and out of place if desired by the engine. This makes a ready method of disassembling and should prove of great value to farmers who desire to do any work on this part of the unit.

One of the features of the rear wheel assembly is the fitting of two extra holes in the wheel hub face which are threaded to permit of the wheel retaining bolts to be used as wheel pullers. The bolts are put into these holes and tightened, and as the holes butt against the solid portion of the hub as the bolts are tightened up they draw the wheels from the axle.

The Fokker Triplane

A "Wireless" Type of Machine of Apparently High Aerodynamic Efficiency—Armed with Two Synchronized Machine Guns

AIRPLANE engineers are working toward the "wireless" machine, by which is meant aircraft of the biplane or multiplane type in which there are no struts, flying and landing wires. It is especially the wires which increase the head resistance, owing to their vibration. The realization of this wireless construction is, of course, facilitated by increasing the number of planes and reducing their length. Triplanes have been built in the past by Curtiss in this country and by Sopwith in England. Recently the Germans have turned to this type and the British have captured a specimen of the new Fokker triplane, a machine in the design of which evidently great attention has been paid to aerodynamic efficiency.

Properly speaking, there are no interplane struts in the Fokker triplane, the wings being designed of such strength that they will withstand all the stresses. In place of the struts there are tie strips, which serve to distribute the stresses equally between the three wings. The same as in a biplane, in a triplane the load in flying is mainly supported by the upper wings, and the strips serve to transfer some of the load to the middle and lower wings. In the Fokker triplane, the distribution of load is perhaps even more unequal than in the average biplane, for the reason that the upper plane has a greater span than the middle plane and the latter a greater span than the lower plane. The tie strips can work effectively only in tension, as their width is less than half an inch and their compressive or column strength is almost negligible.

Owing to the fact that there is no lift bracing, the wing spars have to be made of considerable depth. With this end in view, in the Fokker, the wing is made very thick in proportion to the cord. The two wing spars are placed close together in a box of three-ply wood and this plywood box serves to strengthen the wing with respect to bending stresses, and at the same time to take stresses due to drift.

The upper wing is made in a single piece and is supported from the fuselage by outwardly sloping struts. The middle and lower wings have center sections which are secured to the fuselage, the middle section of the central wing lying on top of the fuselage upper longerons, and that of the lower wings being secured to the under side of the lower longerons.

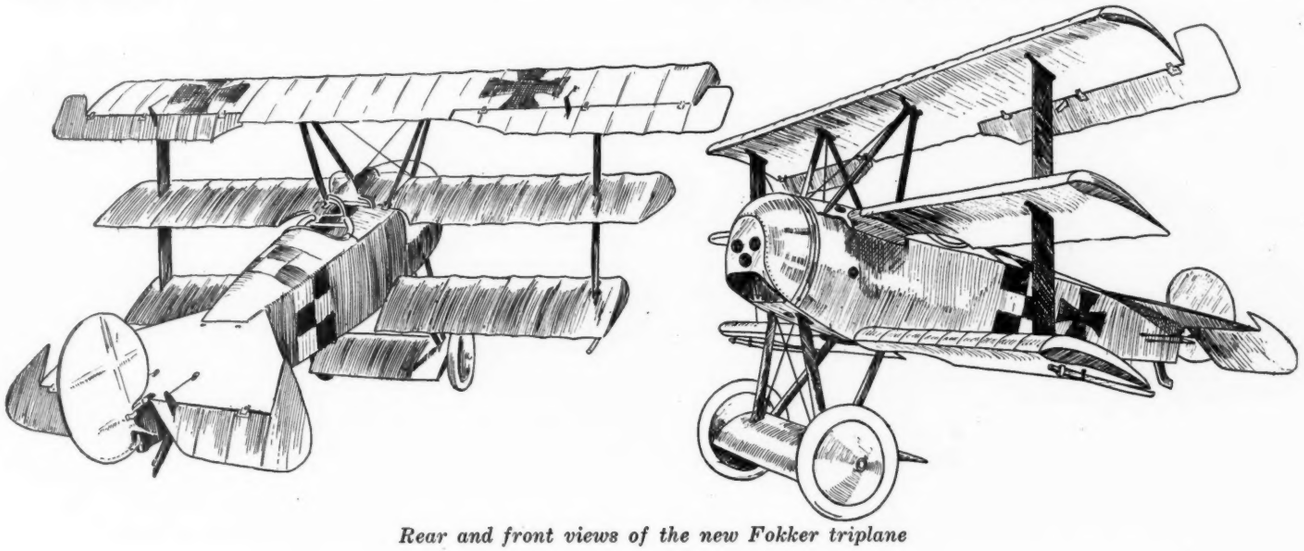
The gap on the Fokker triplane is quite small, considerably less than the chord, and to reduce the detrimental effect of this proportion on the aerodynamic efficiency, the wings are staggered. With a small gap there is always a certain amount of interference with the air currents and this particularly reduces the drift and lift ratio.

One of the innovations in the Fokker triplane is a casing for the wheel axle, which is made with a camber so as to act as a wing. This casing is made of plywood and its shape and size are such that the lifting effect on it is probably considerably more than the weight of the landing gear.

Fuselage of Steel Tubular Construction

In the fuselage, steel tubular construction is employed exclusively, the longerons as well as the struts and cross members being of steel tubes and welded together. The tail plane, elevator and rudders are made of steel and are of symmetrical section. They are very thin and no external bracing is used.

A rotary type of engine is fitted, the main engine plate being bolted to the nose of the fuselage and there being a pyramid of steel tubes supporting at its apex the rear end of the crankshaft. Immediately in front of the engine plate there is a sheet of aluminum. The armament includes two machine guns, synchronized with the propeller and shooting through the blade arc. These guns are operated through triggers and Bowden cables, the operating device being mounted on the control lever. According to data painted on the machine, the weight is 827 lb. and the load capacity 429 lb.



Rear and front views of the new Fokker triplane

Performance Tests by Accelerometer

Deceleration Curve Traced by Recording Accelerometer Gives Means of Determining Traction Resistance—Engine Horsepower May Be Closely Calculated from Acceleration Values

By H. C. Skinner

HORSEPOWER curves as a rule are very deceptive, a fact with which most engineers are well acquainted. The reason is that it is possible to secure a snap reading during a dynamometer test that is not a true indication of an engine's ability. On the other hand, the accelerometer offers a method of determining the power output of an engine which gives results that will seldom deviate more than 3 per cent from those of an accurate dynamometer test.

The fact that a motor car has a high horsepower rating does not always signify that it is a better performer than a car with less horsepower, as the maximum torque and the speed range through which this torque is fairly constant are sometimes the determining factors. The weight of the car and the acceleration deemed necessary by the designer, or, rather, that which is demanded by the sales department, determine the power output and the character of the torque curve required.

From the required acceleration the tractive effort can be obtained and this in conjunction with the gear ratio, wheel diameter, car weight and mean effective pressure determines the necessary cubic displacement of the engine for such a car. However, instead of assuming these values, let us analyze data secured from actual practice.

If one has the rates of acceleration and deceleration in feet per second per second for equal speed increments throughout the range of the car, the weight of the car in pounds, the rolling resistance in pounds, the engine dimensions and the projected area of the car in square feet, it is possible, by means of these data, to arrive at a fairly accurate estimate of a car's ability.

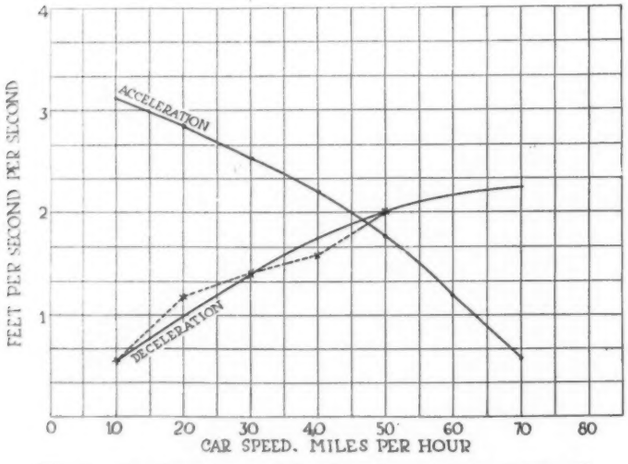


Fig. 1—Acceleration and deceleration with 3 x 5 12-cylinder engine. Car weight, 5100 lb. Axle reduction, 4.36:1. Tires, 37 x 5. Top, windshield and curtains up. Dry concrete road

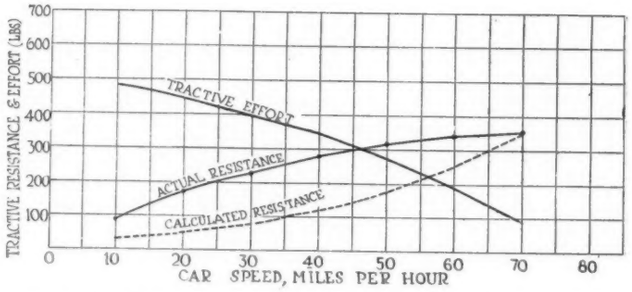


Fig. 2—Actual tractive effort, actual and calculated retardation, showing probable losses in power transmission

In Fig. 1 are shown the acceleration and deceleration curves of a certain American car. The data from which the curves were drawn were obtained by means of a Wimperis recording accelerometer, being the average readings taken on six round-trip trials on high gear on a perfectly dry, smooth concrete road with no perceptible grade.

From the deceleration values plotted in Fig. 1 it is possible to determine the total tractive resistance of the vehicle, this being the sum of the rolling resistance, internal resistance of the mechanism and air resistance. Force is equal to mass multiplied by acceleration. Thus, if the deceleration values for different speeds are multiplied by 158.3 (5100/32.2) the result is the actual tractive resistance as plotted in Fig. 2. By trial on the road the rolling resistance was found to be 25 lb.

Now, if the amount of the air resistance is determined for different speeds throughout the speed range of the car, varying by 10 m.p.h., by the equation

$$F = 0.003AS^2,$$

where F is the force in pounds, A is the exposed area in square feet and S is the speed in miles per hour, the tractive resistance can be calculated by the addition of the rolling resistance factor. The result is represented by the broken line curve in Fig. 2. This latter curve, however, does not take into consideration the losses due to power transmission, and the area between these two curves may well represent these losses.

In order to simplify the calculations we may develop a horsepower formula for use with the Wimperis accelerometer which will apply equally to acceleration and retardation tests.

$$\text{Hp.} = \frac{FV}{1{,}980{,}000}$$

where F is the force in pounds and V the velocity in feet per hour.

$$F = Ma = \frac{Wa}{32.2}$$

where M is the mass, W is the weight in pounds and a

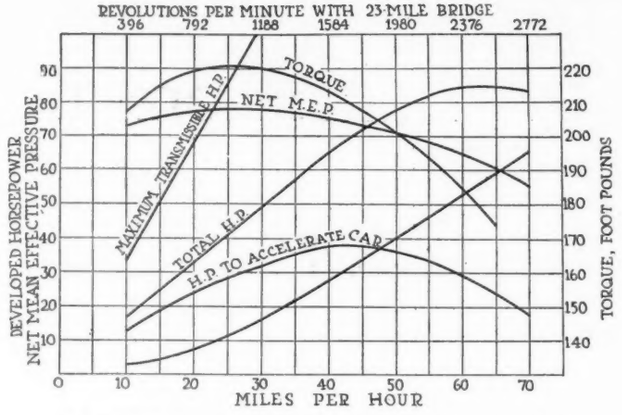


Fig. 3—Power characteristics of car from accelerometer data

the acceleration or deceleration in feet per second per second. Now

$$V = S \times 5280$$

where S is the speed in miles per hour. Substituting the values of F and V in the horsepower equation, we get

$$\frac{WaS \times 5280}{32.2 \times 1{,}980{,}000} = \frac{WaS}{12{,}075}$$

All of the values in this equation can be obtained directly from the data.

Thus if the results of the acceleration and deceleration curves be substituted in this equation and the values plotted as in Fig. 3, the horsepower necessary to accelerate the car and also that necessary to drive it (the power required to overcome tractive resistance) are shown. Obviously, then, the sum of the horsepower required for driving and the horsepower to accelerate will equal the total brake horsepower of the engine. Having determined the brake horsepower and knowing the engine dimensions, the torque and brake mean effective pressure can be calculated and their curves plotted.

The maximum horsepower which can be transmitted by a given vehicle is limited by the distribution of the car weight. In practice the tractive effort available is limited by the weight on the driving wheels and the coefficient of friction between the tires and the road. This coefficient of friction may be as high as 0.6 at low car speeds and as low as 0.3 at high car speeds. If one-half of the weight of the 5100-lb. car is on the driving wheels and the friction coefficient is 0.5, then the tractive effort cannot exceed 1275 lb. The maximum horsepower that can be transmitted, as shown in Fig. 3, is

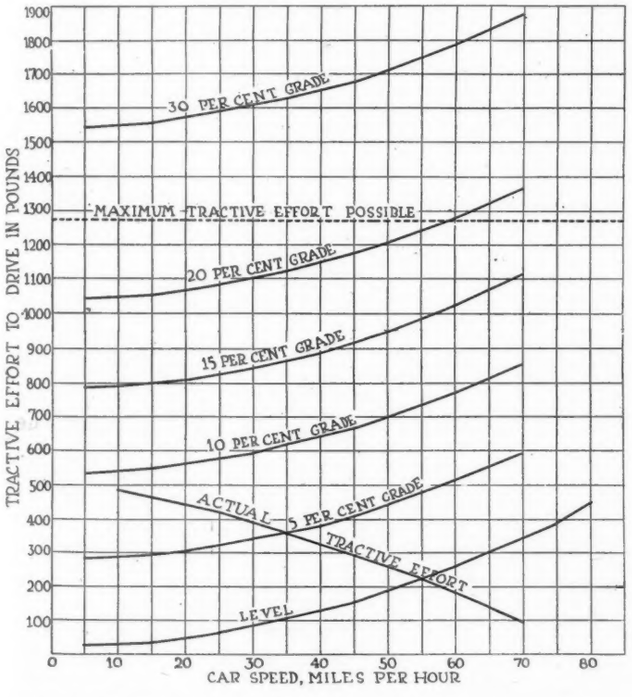

TRACTIVE EFFORT TO DRIVE IN POUNDS
30 PER CENT GRADE
MAXIMUM TRACTIVE EFFORT POSSIBLE
20 PER CENT GRADE
15 PER CENT GRADE
10 PER CENT GRADE
ACTUAL 5 PER CENT GRADE TRACTIVE EFFORT
LEVEL
CAR SPEED, MILES PER HOUR

Fig. 4—Tractive requirements for various grades. Car weight, 5100 lb. Rolling resistance, 25 lb. Air resistance on 22 sq. ft.

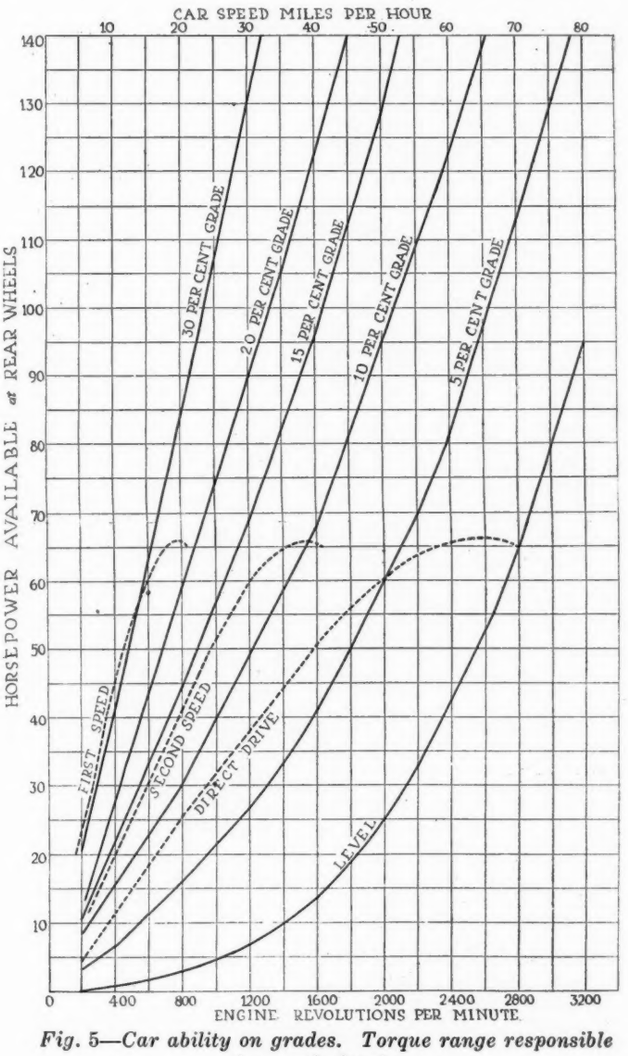


Fig. 5—Car ability on grades. Torque range responsible for good showing

obtained by substituting this value in the horsepower equation and using different car speeds.

If the power plant were capable of exerting a tractive effort of 1275 lb. the maximum acceleration would be 8.05 feet per second per second. This value is absurd, as it would be a source of discomfort to passengers. The real maximum acceleration is 3.1 feet per second per second, which is within the limits of comfort to passengers. Obviously, then, there is a practical limit to acceleration from the standpoint of design and manufacture.

Now the tractive effort necessary to drive on the

(*Continued on page* 846)

Training Schools in Factories

Methods Found Best for Schooling Women in Handling Machinery—Plans for Increasing Workers' Efficiency—Dayton Recording & Computing Machine Co.'s Method

By Allen Sinsheimer

WASHINGTON, D. C., April 22.—The Department of Labor states that 1,500,000 people must be trained for industries in this country. The Army has taken many semi-skilled men. Industries requiring skilled workers have increased many hundred per cent since the declaration of war. Taking skilled workers from one factory to work in another is robbing the left hand to pay the right. American manufacturers will have to learn to fit the key to the lock. They will have to train workers to fit the job. They will have to stop going to the locksmith for keys that fit and use the keys in their possession. That means conservation, and conservation is the road to victory in this war.

The recent reports of the Department of Labor show 8000 applications for work of which fewer than 200 were skilled or semi-skilled applicants. At this time the great majority of the men working in our war factories are under-skilled for satisfactory production. With training, they can increase production from 50 to 100 per cent. This has been demonstrated by the National Section on Industrial Training for the war emergency, a section of the Council of National Defense.

This section includes representatives of employers and of labor, together with many industrial engineers and other experts in industry and shop training. It has branch committees in New England, New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Michigan and Wisconsin. It will co-operate with any large employer whose organization comprises 300 or more workers and will analyze his factory, his product and his requirements and outline a course of training to be installed and designed to convert unskilled and semi-skilled workers into skilled workers in from two days to six months, depending on the facilities and the product.

The committee bases its plans for training unskilled men on the result of numerous observations of trade schools and of experimental factory training organizations. It has been found that unskilled, inexperienced workers can be trained to become efficient operators on machine tools, either in regular machine work or tool work, by subdividing the processes and training the recruits under exact shop conditions. It has learned that instructional work given as a part of the shop system is most profitable and that the matter upon which instruction is given should be part of the factory job, and, as far as possible, should enter into factory production. This training will make operators in one or more processes capable of getting production, not skilled tradesmen. They should be trained upon the same kind of work in the factory training school, and according to the same conditions as they will work under later in the factory. The same accuracy required of the regular job should be demanded of the instruction job. Blueprints and measuring of tools should be taught insofar as they are connected with the job.

These plans have resulted in success. Men have made good after one week or two weeks of training by this method. An unemployed shirt ironer at the end of three days was capable of turning, forming and threading a bolt job on a hand-screw machine with good production. At the end of a week's instruction he could

Educating a Factory Force

500 Per Cent Increase

THE present factory is, of course, insufficient for an organization 500 per cent increase and a new factory proportionately large is constructed. Call the original factory A and the new factory B.

Factory A operates ten hours a day, six days per week on regular production.

The local Board of Industrial Education which exists in practically every city arranges to take over Factory A as an evening school.

Approved applicants taken from the various occupations depleted by war conditions causing unemployment, desiring work in Factory B, are enrolled as evening students without pay.

The foremen of departments in Factory A are engaged as teachers in the evening school. If conditions warrant it, instruction is also given on Sundays.

Regular production is carried on in the evening plant school.

The company provides plant, heat, light and equipment without charge, being compensated therefor by production and the training of the men.

City educational authorities defray the expense of instructors' salaries from public educational funds.

Applications for instruction come from workers whose employment is affected by the war and who would otherwise be unemployed.

This evening school trains them for the new occupation and improves the wage scale by bridging the gap caused by turn-over in employment before the employee becomes idle.

set up his machine. A grocery clerk learned in a week to operate a milling machine effectively and to read the blueprints related to the work. Men with fewer than 200 hours of instruction upon hand-screw machines have been able to set up their machines and completely care for their jobs. Twice that number of hours have been sufficient to turn out proficient, automatic screw-machine men capable of handling the job completely from the operating to the setting up of the machine. Milling-machine operators can be made in less than a week; lathe operators, seven to ten days; planer operators and shaper operators, one to two weeks. Training for foundry work, drafting rooms, inspectors and main assembly work can be given the same way with equally good results.

H. E. Miles, chairman of the National Section on Industrial Training, journeys throughout the country urging employers to install industrial training, and showing them how.

One of the most successful plans followed by the section is outlined in the following layout for increasing the number of skilled workers in a motor truck factory. Taking for the problem a city of 20,000 and a truck factory employing fifty men, with war orders calling for an increase to 500 men, we have the problem, "How will the additional number of men be obtained in training?" The solution provided by the section is given herewith:

The chief features of the plan are found in that it provides opportunity for training the unemployed, cuts down dilution, eliminates turnover, secures maximum intelligence in war production and provides facilities to localities which have no available technical schools. It reduces considerably that costly problem of unemployment and brings the cost of training to a minimum.

This plan was tried and successfully demonstrated. It saved one company from $60 to $85 per man on the cost of breaking him in. It improved the general local conditions by improving the workers of the locality. Following one week's training in the evening school, the director stated, "The head of the final assembly department of the factory has already selected men from the night school who, in the course of a few weeks, will be sufficiently advanced for day work."

The most significant and enlightening training-school experiment is that organized by C. U. Carpenter, works manager of the Dayton Recording & Computing Machine Co., in collaboration with the industrial training section. The company has manufactured the Russian combination time fuses, a work of the closest character, with limits running as low as five-ten-thousandths of an inch. The precision work on the fuse is severe. The metals used are brass and aluminum. The operators for this factory are instructed in a special training department. Care is exercised in the original selection of workers to insure a high grade of intelligence wherever possible.

Operators are trained upon one particular operation when selected. They are selected especially for that operation. However, after starting shop work and acquiring a familiarity of general machining, the operators are found to become fairly well versed in mechanical knowledge. Many of the skilled operators are found among the men and women of mature age. The younger workers, though more vigorous, are less careful and steady, and more likely to change positions, and the continuous work of mature operators raises their average production above that of the younger and more vigorous. For this reason the company has selected older men occupied in non-mechanical trades to replace the younger men taken by the draft and finds them, after a short course of training, sufficiently skilled to turn out munition work of the most precise character.

The factory employs 8600 people, of whom over 5000 are women, and practically all of the mechanical operations are performed by the female section, which is performing a work that in the past was given only to skilled men operators. The women have been selected from the ranks of school teachers, store clerks and girls who have been doing general work both in homes and factories.

They are never brought directly into the shop to learn the machine work but instead are started in the mechanical training department located in a well-lighted room apart from the factory and containing all of the different types of machines necessary for the training, including also the necessary benches and fixtures for instruction in assembly and inspection. A very careful and expert mechanic and operator was selected as the head of this department.

One of the requirements for the position included ability to get along well with women and the habits and actions of a gentleman. Women were selected for teachers. Girls coming into the school and seeing other women do the work quickly learned to make up their minds if other women could do it they could do it also. The system of teaching is standardized, the teacher handling three to five girls at a time, depending on the nature of the work. The pupils are first taught the character of the metal in the part and the kind of tools used, the teacher going over carefully with each individual employee the work that each tool is supposed to do, the machine being operated in order to illustrate each point. The girl is then permitted to start work herself and corrected in a kindly manner with encouragement with each error. The girls are taught the use of gages as well as the use of the different tools.

The girls are paid twenty cents per hour while learning and a careful record of progress and efficiency is maintained. The length of time for teaching the operators varies with the class of work, but ranges from three to ten days. The girls have graduated from the training department in fewer than ten days to successfully operate heavy hand turret lathes on work demanding severe precision. The records show that production from the machines in the training department is much greater and more accurate than production from the same machine under the old method of training the employee in the shop. Further, these trained girls within three weeks after entering the shop, in almost every instance, reach

Method for Training Operators

1—*A method of training operators to attain a clear average production.*

2—*A system of continuing the training in the shop with job bosses and special shop instructors.*

3—*A system of organization compelling the subordinate and also the directing heads of departments to give attention to the new or inefficient workers and train them to be better workers. This includes factory systems which make such close supervision possible.*

4—*A fair system of pay rewarding the employee for reaching higher production. Equal pay for women and men where the production is equaled. A system of bonuses providing that the average operator can earn even when producing less than the number of pieces per hour shown as possible.*

5—*Supervision preventing operators from overwork through attempt to earn high bonuses.*

a production that entitles them to bonuses distributed under a graduated bonus pay system.

After leaving the school, the girl employee becomes a part of the system of organization by which there is a male job boss over each group of seven or more women, a man selected with great care for his mechanical ability and character. It is his duty to maintain the efficiency of his female operators at a point of good production and pay. His particular duty is the continuance of the training in the shop of those operators last out of the training department. He receives a bonus dependent on the output of the group under his control, and it is an inducement, therefore, for him to help the newer and less capable operators rather than to concentrate on the good ones. Care is taken that the job boss does not drive his group. The company carefully explains its policy to all of the employees at frequent meetings.

An example of woman efficiency in production was that of a small aluminum forging which was machined on hand turret screw machines—the most difficult job in the factory. This forging had fifty-six gaging points with allowable limits from five-ten-thousandths of an inch to two-thousandths of an inch. In January, 1916, the average production of thirty-one women employees was eight pieces per hour. Although the operators were apparently very busy, experiments showed that thirty-five pieces should be produced per hour. The old operators went into the training department and in four weeks these, together with some new operators, raised the average production to more than twenty-five pieces per hour. To-day the average is fifty-five pieces per hour. This has been the same result in machining inspection and assembly. As an example of what the women are doing in assembling, Mr. Carpenter points to the fact that 2000 girls working in the assembly department and turning out 15,000 complete fuses per day in two shifts, after a course in training, produced 38,000 complete fuses per day in one shift.

Outline of Training in Dayton Plant

A complete training system in the Dayton plant was outlined by Mr. Carpenter and is given herewith:

The work of the Industrial Training Section is being rapidly accepted by employers throughout the munitions factory centers. The Bethlehem Steel Co., employing 40,000 workers, has taken up the industrial training work. Buffalo has entered actively into the work as a community matter. The Pierce-Arrow Motor Car Co. has installed a complete industrial training organization and other leading manufacturers in the city, in order to prevent drawing upon the workers of the other factory, are planning to do likewise. In the Curtiss airplane plant a training school has been inaugurated under the direction of F. L. Glynn, formerly State Director of Vocational Education. Employees of the Wright-Martin Airplane Corp., New Brunswick, N. J., are receiving an industrial training course under J. F. Johnson, formerly director of the Connecticut State Trade School, who has developed a training system for airplane engine operators and who will later develop training in the standard aircraft factory at Elizabeth. Detroit is thoroughly committed to this training. J. M. Eaton, formerly Director of Welfare with the Cadillac Motor Car Co. and now connected with the Lincoln Motor Co., has developed a system of training in the Lincoln plant similar to that in the Dayton Recording & Computing Machine Co. The Lincoln Company advertised for 300 women, of high moral character, for machine operation, age 28 to 35, with relatives at the front, no previous experience required. Sixteen hundred replies were received. Careful selection was made and the 300 women who went through the training school have displayed earnestness, speed and accuracy in production work. The Nordyke & Marmon Co., Indianapolis, has inaugurated a similar training course.

England and France delved to considerable depth in this work long before we considered it here. France provides for compulsory training of operators. The war quickly depleted its corps of skilled workers. Technical schools were soon found to be insufficient. Schools were inaugurated in every works employing 300 workers or more, where a training shop had to be organized by law for improving both the skilled and unskilled workers, and from which pupils have been graduated every two or three months in the past three years who can turn or use ordinary machine tools to an accuracy of .0008 in., set up lathes or ground tools, etc. The French, however, instead of starting the girls in the training schools, preferred to have them first work in the general shops and display some aptitude and intelligence. The training shops are usually installed either in the tool rooms or a small affiliated shop, and an hour a day is given to general technical instruction such as the reading of drawings, names of the principal materials and processes used in the shops, together with discussions of strength, elasticity, hardening, etc., of the metals. This instruction is in addition to the regular production instruction. It is compulsory that during the whole of the training period, wherever it may be taken, the French employer must continue to pay the workers on the basis of what they earned previously in manufacturing.

French and English Experiences Alike

The results obtained from the French paint shops appear about equal with those secured in England, where employers and workers have voluntarily developed training. Early in the war in England it was learned that tool makers, skilled machine operators, inspectors and subdepartmental heads were particularly lacking in the munitions factories. The emergency was met by the inauguration of training sections in the factories, in which men from 41 years to 45 years and beyond were first placed. Women were added later when their value became apparent to the British officials. During the training periods a weekly wage equivalent to $9 per week was paid, and in some cases an extra subsistence allowance of $5 was made. The plan throughout has been very similar to that developed in this country by Mr. Miles, with instructors taken from the ranks of foremen and departmental heads in the factories, and with the training course preceding work in the factory.

Employers desiring to inaugurate the training course in their factories—what Mr. Miles styles Vestibule Training Course—can secure complete co-operation and collaboration from the Industrial Training Section by communicating its desires to the parent committee, the Labor Committee, Council of National Defense, Washington.

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Aeronautical Society Lectures

EDUCATIONAL lectures on aircraft topics are being given in London, Leeds, Lincoln, Coventry, Norwich and Peterborough under the auspices of the Aeronautical Society of Great Britain. The subjects of the lectures and the lecturers are: "History and Development of the Aeroplane," by Captain F. M. Green; "The Aerofoil and Fluid Flow Round Bodies," by E. F. Rels; "The Air Screw," by A. Fage; "The Modern Aeroplane," by F. H. Branwell; "Materials and Methods of Design in Construction of Aeroplanes," by J. D. North; "Industry and Development of Balloons and Airships," by Commander W. Lockwood Marsh; "Constructional Methods, Airships and Balloons," by Wing Commander J. N. Fletcher; "Stability and Control," by Captain R. F. C. Aston; "Airships," by Captain J. S. Irving; "Meteorology and Navigation," by Professor W. G. Duffield.

Gear Standardization Decided On

American Gear Manufacturers' Assn. at Annual Meeting Decides to Enter Immediately Upon Standardization of Mechanical Design and Commercial Practice

By P. M. Heldt

WHITE SULPHUR SPRINGS, W. VA., April 20—After a series of sessions extending over a period of 3 days, every moment of which was crowded with lively discussion on subjects pertaining either to the design or production of gears or to the commercial methods employed in connection therewith, the second annual convention of the American Gear Manufacturers' Association came to a close here this afternoon. The meeting was a most successful one in every respect and the pleasant days spent in beautiful surroundings will long be remembered by the attending members and guests.

Only a little over 1 year old, the A. G. M. A. has enjoyed a rather remarkable growth. Starting with nine charter members at the organizing meeting in Lakewood, N. J., on March 26, 1917, the membership has now attained 40 concerns, including practically all the important firms in the gear cutting industry. Stated in general terms the object of the association is to improve conditions in the gear cutting industry, but in the pursuit of this object the association will engage in various lines of activity, such as the conduct of meetings at which technical papers relating to various phases of gear manufacture will be read and discussed; the standardization of design and of commercial practice in this particular branch of industry and the correction of trade abuses. A short discussion brought out the very wide range of subjects which may receive the attention of the association's standards committee.

President F. W. Sinram in his opening address referred to the rapid growth of the association and pointed out that the membership now extended from coast to coast. One result of the year's work had been that the gear men had become acquainted much better and that a feeling of confidence and mutual respect had been engendered. This was the cornerstone on which the structure of the association would have to be reared. Gear manufacturers had pursued their individual ways far too long. Trade or industrial organization was the order of the age. Times were moving fast, and an unorganized industry was handicapped. There was a very large fixed investment involved in the gear industry. Mr. Sinram asked why many users of gears produced their gears themselves instead of buying them from specialists —the members of the association—and said that Mr. Waterman's paper on standardization furnished the answer. These were strenuous times, and many of the members were very busy, but it was necessary to build for the future.

Officials of A. G. M. A.

F. W. Sinram of the VanDorn & Dutton Co., Cleveland, President

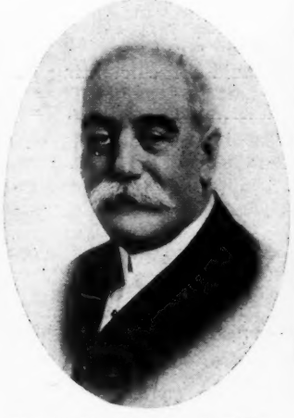
Mr. Sinram said that the national Government had received the assurance of the association's co-operation and that the association was now a member of the United States Chamber of Commerce.

In starting the second year of the association's activities standardization should receive immediate attention. A gear standard to be recognized should be an A. G. M. A. standard. Mr. Waterman would read the report of the Standards Committee, of which he was chairman, and this should be followed by constructive criticism. They should work together all the time for standardization. During the past year the officers had given freely of their time, and the association was especially indebted to Secretary Hamlin.

F. N. Sheppard of the United States Chamber of Commerce spoke on "What

Frank Hamlin of the Earl Gear & Machine Co., Philadelphia, Secretary - Treasurer

H. E. Eberhardt of the Newark Gear Cutting Machine Co., Newark, N. J., Vice-President



Frank Horsburgh of Horsburgh & Scott Company, Cleveland, retiring Treasurer

B. F. Waterman of the Brown & Sharpe Co. of Providence, Chairman of Standards Committee

the Business Man Can Do for the Government." He urged all business men to take an active interest in the conduct of their Government, not only now but also in normal times. It was a fact that business men were inclined to neglect their political rights and duties, which permitted self-seekers to get in. The representatives in our national Government were usually as good as the districts whence they came. They represented not the best but the average element of the district, and it was our duty to raise the standard.

Long did American business suffer without a national mouthpiece. The U. S. Chamber of Commerce was organized only after the national Government had sought the advice of the country's business interests. It was the spokesman for one thousand commercial organizations with a membership of 500,000. It took European business with direct government support 50 years to accomplish what was accomplished here in 5 years. President Wilson had said that it was very useful to have such an organization to refer to. Twenty-four questions had been submitted to the membership in the form of referenda, these including questions relating to the tariff, railroads, national defense, conservation and the commercial boycott of Germany after the war.

Mr. Sheppard referred to the magnitude of the task confronting our Government and gave some figures to illustrate his point. He said that the total expense to run the Government of the United States from the time of Alexander Hamilton up to July 1, 1917, including the cost of the War of 1812, the Mexican wars, the Civil War and the Spanish War, was $26,000,000,000 as compared with $19,000,000,000 which it was planned to spend during the first 15 months of the present war ending July 1, 1918. We must maintain our commercial credits, and to this end it is necessary that Government obligations be widely distributed among the people. Previous to the war 50 per cent of the entire French population were bond holders as compared with one-third of 1 per cent of the United States population. Members of the association should bend every effort to secure the widest possible distribution of Government bonds and War Saving Stamps.

Paper on Heat Treatment

E. J. Frost read the paper on "Hardening and Heat Treating of Gears," by C. R. Poole, Mr. Poole being absent. This paper will be reprinted in AUTOMOTIVE INDUSTRIES. In commenting on the paper Mr. Frost said they had found that a steel part heat treated to work well in the automatic lathe would tear in the Fellows gear shaper, and so a compromise heat treatment had to be adopted.

Mr. Waterman, chairman of the Standards Committee, read the report of that committee, which is reprinted in somewhat abbreviated form in another part of this issue.

J. B. Foote, in opening the discussion, said that in the early years there were a number of ways of figuring on a gear wanted to transmit a certain horsepower at a certain speed. In 1898 Mr. Wigglesworth charted the Lewis formula for six different pitches, and this was very convenient in determining the proper size of gears. Mr. Larson of the old James & Foote Co. got up a formula for calculating gears which he considered very convenient and safe. They had constantly used it in their business and in a period of perhaps 15 years had not had one set of gears returned on account of inadequate strength. Another thing they had found very useful in their practice in connection with worm gearing was to allow the same peripheral speed as they would use for spur gearing.

President Sinram suggested that a resolution be adopted expressing the desire of the association to co-operate with other engineering societies in the matter of standardization. As a result, a committee was appointed to draft a suitable resolution, composed of B. F. Waterman, chairman; Frank Burgess and Frank D. Hamlin. This committee at a later period submitted the following resolution, which was unanimously adopted:

"Recognizing the desirability of co-operation in order to prevent conflict and the putting of more than one standard before the public, the American Gear Manufacturers' Association is willing and anxious to co-operate with other organizations interested in the standardization of apparatus wherein gears are used and in the betterment of conditions in the industries which use gears."

Mr. Gleason asked Mr. Waterman whether in his opinion recent advances in worm gear design did not warrant a steeper pressure angle than the ordinary 29 deg. included angle. Mr. Waterman, in his reply, seemed to favor small angles. He stated that where larger included angles were used, such as 60 deg., it was usually done to avoid interference. Where no interference occurs, the smaller pressure angle gives the better results. Besides there are other methods of eliminating interference. Mr. Foote mentioned the case of a tractor concern in Kansas City which made a tractor worm drive with a 45 deg. included angle, but failed. They then reverted to the 29-deg. included angle and obtained a very successful drive.

Mr. Burgess pointed out the advantages of the Hindley type of worm gear, especially that due to the large contact surface. He had had a large contract from the Government for worm gears for submarines, in which a 14-deg. included angle was used, he believed. He voiced the opinion that it was bad practice in worm gearing with multiple lead worms to have the number of teeth in the wheel a direct multiple of the leads in the worm, as if the teeth of the gear are hobbed this tends to give an uneven thickness of tooth. He considered it the best plan to always have an extra tooth or a hunting tooth, as he called it. In the jobbing business, Mr. Burgess said, it was greatly advantageous to use fly-cutters in cutting gears.

Hardness and Wear

The subject of gear hardness was brought up by W. H. Phillips of the R. D. Nuttall Co., who said that it was a very important matter. Mr. Foote asked Mr. Gleason to say something regarding the wear of gear teeth, and Mr. Gleason replied that he was strongly in favor of hardened gears for all purposes where the cost of hardening was warranted. The proposition ought to appeal to anyone who figured on the life of the machine. Both the life and the efficiency of the gears were increased by hardening. The best results were obtained when both the gear and the pinion were hardened, but where this did not seem warranted they compromised by hardening the pinion only.

Another question that came up was that of cast iron vs. bronze for gears. It was stated that if cast iron was once worked down to a nice surface, it gave very good results, but that bronze would stand more abuse. Mr. Foote mentioned that in connection with the subject of pressure angles for worm gears and the material used for the wheels, there was a possibility that eventually the teeth of worm gearing would be ground, which would permit of the use of hardened wheels, and the grinding, of course, would be facilitated by the use of a comparatively large pressure angle. There was now a machine on the market for grinding gears with straight type teeth.

Durability of Worm Gears

A question was raised as to the durability of worm gearing, and in this connection Vice-president Eberhardt stated that he had recently had occasion to examine the worm and wheel of a brewery truck which had seen 48,000 miles of service, and both members were in good condition. Mr. Ball stated that the White Co. had thoroughly investigated the question of worm vs. chain drive for trucks and had found the chain drive to be the more efficient, with the result that they decided to make the chain their standard drive. He also pointed out that most of the trucks now in use by the Government were chain-drive trucks.

One of the members stated that when worm gears are burnished it removes a great deal of trouble. He had furnished very large worm gears for operating the gates on the Panama Canal locks. These gave trouble owing to excessive pressure, and this trouble was overcome by substituting castor oil for ordinary machine oil. On a later occasion he had made a worm gear set for operating a heavy bridge, and as he knew that the load would be very heavy, he recommended the use of castor oil for lubrication. The engineer,

however, used ordinary black oil, with the result that the gear would not stand up.

S. L. Nicholson, assistant to the vice-president of the Westinghouse Electric & Mfg. Co., was requested to talk on the standardization work done by the Electric Power Club, and the methods adopted in getting the standards of the club accepted. Mr. Nicholson said that when a man wants something special in the electric motor line now it costs him from 15 to 20 per cent more than the standardized product. The Electric Power Club had drawn a chart in which a line of electric motors was represented by speed and torque curves, and from this chart the customer could select a motor meeting his requirements. It was now contemplated to construct cost charts from which could be obtained the expense for different materials entering into the construction of the motor. The reason for this is that the prices of all the materials have been subject to rapid change, and with such cost charts at hand, if the cost of copper went up, say, 15 per cent, it would be an easy matter to determine how much the cost of manufacture of the complete motor would be increased thereby. The Electric Power Club had been carrying on standardization of both engineering practice and commercial practice and of late the latter had become quite as important as the former. The commercial matters which had come under the attention of the club included commercial guarantees, form and size of advertising literature, advertising ethics and trade acceptances.

As another matter deserving the attention of the Standards Committee, Mr. Frost mentioned finish in transmission gears, pointing out that there was a need for the use of standard symbols for different finishes. The Standards Committee might also consider methods of shipment and of protection from rust during shipment. Sometimes the gears would become slightly rusty in shipment and claims would be presented to the makers for damaged goods.

Allowable Backlash

The subject of back lash in gears, Mr. Frost said, should also be considered. In their own plant, in order to avoid trouble from variations in practice in different drafting rooms, they made their own drawings of every part for which an order went into the shop. These were made on standardized sheets and before being sent into the shop were submitted to the customer for his approval. On the subject of back lash, Mr. Burgess said that they had a testing machine, and if they had a set of gears, comprising say a 10-in. wheel and a 3-in. pinion, the foreman would place them on the testing device and approach the centers a certain number of thousandths of an inch, with which adjustment the gears must run smoothly together without back lash. Back lash, Mr. Mr. Burgess said, was absolutely essential in gearing. Mr. Frost said that the demands made regarding back lash by engineers ordering gears were unduly severe and could not be met in hardened gears. Often the noise produced by gearing was due to incorrect cutting or to the shape of the housing, and not to back lash.

Mr. Phillips said that some foolish specifications had been issued by Government departments. At present there was nothing to guide designers, and the association should lead them through the instrumentality of its Standards Committee. Mr. O'Brien said that there was far more trouble from too little back lash than from too much.

The necessity for standard nomenclature in the gear business was pointed out. This, it was said, was especially urgent in connection with worm gearing, as some people used the normal pitch where others used the axial pitch. The question was raised whether anybody had tried long addendum teeth in worm gearing to avoid interference, but no reply was received. One member stated that in his experience a spongy spot on several of the teeth of a worm gear had started cutting.

Metric Bill Discussed

The secretary read a communication relating to a bill now pending in Congress which would make the metric system compulsory in this country after 1925. The communication was from the American Bureau of Weights and Measures on the Board of which there are representatives of a number of very important industrial firms in this country, and it urged the most determined opposition against the proposed legislation. A resolution voicing the opposition of the association to the proposed measure was moved and seconded, but before it could be acted upon several members pointed out that there were certain unquestioned advantages in the metric system and that we might have to come to it sooner or later in spite of all opposition, consequently it would not be wise for the society to "railroad through" a resolution condemning the bill. The upshot of the matter was that a committee was appointed, with Andrew Gleason as chairman, to look into and report on the subject.

Standard Quotation Sheet

William Ganschow emphasized the need for a standard quotation sheet or standard form of contract to cover all conditions. He pointed out that some users of gears placed very large contracts and as soon as a mild slump overtook their industry they would throw back on the gear maker a lot of "regular stuff," claiming it to be defective. At the present time the gear maker had no means of proving that there was nothing wrong with the gears, and perhaps the establishment of an arbitration board composed of members of leading engineering societies would solve the problem.

In this connection Mr. Foote pointed out that members of the association sometimes got parts contracts and about 6 months after delivery they would get back a box of rejected gears and find upon inspection that some of these gears were of their own make while others had been made by competitors. This of course was an abuse that needed correction.

A business session was held on Friday morning. The reading of the minutes of the previous meeting was dispensed with, and secretary Hamlin read his report. From this it appeared that a number of bulletins or questionnaires had been circulated among the membership during the past year, one relating to cost keeping methods and the other to standardization. Mr. Hamlin urged more prompt replies to these circulars, though on the whole the response had been quite satisfactory. The treasurer's report was accepted, and the Woodward Machine Co. of Wooster, Ohio, and the W. A. Jones Foundry & Machine Co. of Chicago, were elected to membership. J. C. McQuiston, chairman of the Publicity Committee, read his report, which was accepted.

Officers Re-elected

A general election was held, nine members of the Executive Committee being elected, three of them for 3 years, three for 2 years and three for 1 year. Eighteen candidates were voted upon all at the same time, the three receiving the highest number of votes being chosen for the 3-year term, and so on. The result of the balloting was to elect the following: F. W. Sinram, H. E. Eberhardt, Frank D. Hamlin (3 years); Milton Rupert, George L. Markland, Frank Burgess (2 years); E. J. Frost, H. W. Chapin and William Ganschow (1 year). The old officers were re-elected, including F. W. Sinram, president; H. E. Eberhardt, vice-president; Frank E. Hamlin, secretary, and Frank Horsburgh, treasurer. Mr. Horsburgh declined the re-election, stating that it was just 50 years since he entered the gear business and that he had reached the point where he would like to take things easy. Mr. Hamlin agreed to accept the post of secretary-treasurer, and it was decided to relieve Mr. Horsburgh of official duties, though it was stated that his 50 years' experience would have been of great value in the official councils of the society.

Reverting to the subject of standardization, Mr. Waterman pointed out that if something was to be accomplished the work must be done by sub-committees, and suggestions must be invited from every member company. It would be necessary to have divisions of the committee to deal with different classes of work. President Sinram said that what appealed to him in connection with their standardization scheme was that every member would have a chance to be heard, not only when a standard was first proposed but also before it was finally accepted.

Mr. Frost mentioned the need for a device for inspecting cutters. Sometimes they would get cutters from the manufacturers that did not produce the proper form of tooth. They would send the cutter back to the maker but it would

be returned to them with the remark that the cutter was correct. The fact remained, however, that it would not give a gear that would mesh correctly with another gear, while if a different cutter was substituted the gear would mesh perfectly. Wouldn't it be possible for the association to have a committee, say, at the Brown & Sharpe plant to inspect and report on the accuracy of the cutters in such cases? It was moved by Mr. Sawtelle that the matter of inspection of cutters be referred to the Standards Committee.

The subject of a standard form of contract was again taken up, it being suggested that a committee be appointed which should obtain from all of the member companies copies of their contract forms, select the best features of each, and draw up a new form which should be submitted to the association. Messrs. Frost, Rupert and Ganschow were appointed a committee on standard contract form, and they handed in a preliminary report on the following day which was very favorably received. It is likely, however, that before any action is taken on the form the matter will be gone through on the lines suggested, of obtaining forms from all of the member companies and sifting out the most desirable features.

Commercial Practice

In the line of commercial practice, one member pointed out that it was the rule with his company, in case a stop order was received, to immediately figure up all expense occasioned them by the order and to send the customer a bill for the amount. Another point brought up was that of blowholes in gears, which were often made the excuse for returning work. In case the customer furnished his own blanks he would pass the gears even though a rathole might extend half way around the gear, but if the gear maker furnished the blanks, a slight pinhole in a tooth was often made the basis of a kick. This matter of blowholes was referred to the Commercial Practice Committee. The association also has a Legal Committee, the duties of which, among others, will consist in passing upon any standard contract form that may be submitted for adoption.

One feature which it was thought desirable to include in the standard contract form was that goods are sold f.o.b factory, freight being allowed or not, as the case may be. This relieves the manufacturer of responsibility for delay in delivery due to freight congestion which is an important matter at the present time.

The first step taken at the final meeting on Saturday was to elect the Gleason Works, Rochester, N. Y., James E. Gleason, representative, a member of the association. Mr. Waterman of the Brown & Sharpe Co., suggested that A. L. Stewart also of the Gleason Works, who, he said, had a wonderful knowledge of inspection methods, be invited to join the association. The committee on the metric bill was completed by the appointment of James E. Gleason, chairman; B. F. Waterman and Frank Burgess. Mr. Frost, chairman of the committee on a standard form of contract, read his preliminary report, which covered, among others, such items as returned goods, freight charge, limit of time for inspection, hold-ups, alterations in specifications, terms of payment, unavoidable delays and infringements. It was suggested that the form should include clauses that the manufacturer "does not guarantee the performance or durability of the gears," and that "delivery is contingent upon strikes, fires and conditions of war"; also that the customer is to pay for any gears that may be destroyed by tests.

Engineering Work for Customers

Mr. Ganschow brought up the matter of engineering work done for customers. People often came to gear manufacturers and requested them to work out designs of gearing to accomplish certain objects. After this had been done they would take the blueprints and submit them for bids to the whole field. This he thought was unfair. The subject of responsibility for poor performance should also be covered fully. An instance of this was in connection with rawhide gears which were often purchased for stock, and laid around for many months, with the result that when they were finally placed in service they had dried up and lost their strength.

Referring to the matter of engineering work done for customers, Mr. Diefendorf said that it was the practice of his company to state in the quotation that "The quoted price includes $— for design and the privilege of use of the fixtures, the manufacturer retaining ownership of the fixtures." He said that the charge made for fixtures never equaled the cost thereof, because if it did they would not get the order.

Mr. Diefendorf also brought up the subject of rates of wages paid for different classes of machine work in different localities. He thought it would be of considerable help to the members if the secretary should obtain from each member periodically the rate paid for each class of work, and circulate this information among members.

Uniform Cost Accounting

It was at this session that J. H. Dunn read his paper on cost accounting methods, which will be abstracted in an early issue of AUTOMOTIVE INDUSTRIES. Mr. Frost asked Mr. Dunn whether he had any preferred way of splitting up the overhead charge among individual orders. Mr. Dunn said that it had been the custom of his firm at an earlier period to distribute the overhead charges on a machine-hour basis, making the same charge for all classes of machines. The result had been that they were loaded up with heavy work and failed to get any of the lighter work. They now had a different rating for each machine tool and this method made the estimated cost very close to the actual cost. On the same subject J. C. O'Brien of the Pittsburgh Gear & Machine Co. said that they divided overhead expense into sixteen different accounts, of which eight were fixed. They took an 18-in. engine lathe as the unit, a 24 in. engine lathe was given a rating of 150 per cent and a Warner & Swasey lathe 300 per cent. In this way each tool was given a rating; an average labor rate was assumed for each machine, and this was checked up with the total number of hours.

Mr. Nicholson of the Westinghouse company described the method of cost accounting developed by the Electric Power Club which had received the approval of the Federal Trade Board. There was quite an advantage, he said, in using this cost accounting system. For instance, in the matter of taxation, the government could not object to the method of bookkeeping by which the profits were arrived at, if this method had the approval of one of its departments. The percentage of overhead charged to labor would vary with the cost of labor, and the labor charge should be restricted to certain items. Labor overhead and machine overhead should always be kept separate, because the latter did not vary.

Hobs and Hobbing

The last paper to be presented to the association was one on Hobs and Hobbing Machines by F. G. Hoffman and John Edgar of the Barber-Colman Co., Rockford, Ill. It will be reprinted in AUTOMOTIVE INDUSTRIES. In the discussion of this paper Mr. Foote said that he had had a lot of hobbed pinions come back from the Coast which while running well with their mate would not run with a gear cut by means of a Brown & Sharpe rotary cutter. Mr. Edgar said that his firm did not recommend the use of hobbed pinions with wheels cut by means of rotary cutters, and that both members of a set should always either be hobbed or produced by some other process.

Another difficulty in connection with hobbing was mentioned by Mr. Hamlin. He made particular reference to a claim made by the hobbing people that in hobbing a gear the entire circumference was uniformly heated and the expansion due to heat was therefore equal all around. Mr. Hamlin said that in cutting gears with exceedingly wide face, say 8 in. wide, in a vertical spindle machine, as you started cutting at the top end, the blank would be cold, but when you came through at the bottom, the whole blank would be heated to a considerable degree, and would consequently be expanded and the teeth cut to a greater depth at the bottom end. The result would be that the gear would not be of uniform pitch diameter from end to end. A similar difficulty was mentioned by Mr. O'Brien, who said that a large gear wheel with a central web when cut by the hobbing method would assume an hour-glass form upon cooling.

Mr. Burgess said that while there were certain limitations

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Heat Treatment of Gear Blanks*

Outlining the Advantages of Thoroughly Annealed Blanks to the Subsequent Machining and Hardening Operations

By C. R. Poole

IN the past few years great advancement has been made in the heat-treating and hardening of gears. In this advancement the chemical and metallurgical laboratories have played no small part. During this time, however, the condition of the blanks given the machine shop to be machined has not received its share of attention in the heat-treating department of many forge shops, and in many cases has been neglected or not considered by the machine shops themselves. This is especially true of shops using only the lower carbon steels.

Two Types of Gears

There are two distinct types of gears, both types having their champions, namely, carbonized and heat-treated. The difference between the two in the matter of steel composition is entirely in the carbon content, the carbon never running higher than twenty-five point in the carbonizing type, while in the heat-treated gears the carbon is seldom lower than thirty-five point. The difference in the final gear is the hardness. The carbonized gear is file-hard on the surface with a soft, tough and ductile core to withstand shock, while the heat-treated gear has a surface that can be touched by a file with a core of the same hardness as the outer surface.

With the exception of several of the higher types of alloy steels, where the percentages of special elements run quite high, which causes a slight air-hardening action, the carbonizing steels are soft enough for machining when air cooled from any temperature, including the finishing temperature at the hammer. This condition has led many drop forge and manufacturing concerns to consider annealing as an unnecessary operation and expense. In many cases the drop forge has only heated to a low temperature, many times just until the piece showed color, to relieve the so-called "hammer-strains." While this has been only a compromise it has been better than no reheating at all, although it has not properly refined the grain, which is necessary for good machining conditions.

Theory of Heat Treatment

Before going to the effects of proper annealing temperatures for the most commonly used steels, we will briefly consider the theory of heat-treatment. Heat-treatment, in the broad sense, is the thermal refinement of the structure of steel and covers four operations, namely, annealing, carbonizing, hardening and drawing or tempering as it is commonly called. All of these operations are based on the fact that in heating a piece of steel the structure undergoes a change of from one to three points on heating and a corresponding number of changes on cooling, these changes being caused by a molecular rearrangement of the carbon and iron. The points are known as "critical points" or "critical ranges" and vary in number according to the composition of the steel. These points on heating are often referred to as "decalescent points" and on cooling as "recalescent points." Carbon exerts the greatest influence on the location of the critical points, with nickel and chromium coming next. A straight carbon steel up to thirty-five point carbon has three critical points, from thirty-five to eighty-nine point carbon two critical points, and over eighty-nine point carbon only one critical temperature. Each per cent of nickel will lower the critical point 20 degrees F., while each per cent of chromium raises the point 10 degrees F. Of the critical points those found on a rising temperature are higher than the corresponding points on a falling temperature. Rising temperatures are always considered in correctly heat-treating a piece of steel. In order to produce the most complete rearrangement of the molecules of carbon and iron and therefore the greatest refinement, it is necessary to heat to a temperature slightly in excess of the highest critical point.

Four Processes Defined

Annealing is the heating to a temperature slightly above the highest critical point and cooling slowly either in the air or in the furnace. Annealing is done to accomplish two purposes: (1) to relieve mechanical strains; (2) to soften and produce a maximum refinement of grain.

Carbonizing is the operation of imparting to a low carbon steel a shell of high carbon content. This produces what might be termed a "dual" steel, allowing for an outer shell which, when hardened, would withstand wear and a soft ductile core to produce ductility and withstand shock. The operation is carried out by packing the work to be carbonized in boxes with a material rich in carbon and maintaining the box so charged at a temperature in excess of the highest critical point for a length of time to produce the desired depth of carbonized zone. Generally maintaining at 1650-1700 deg. Fahr. for 7 hr. will produce a carbonized zone 1/32-in. deep.

Hardening is the heating to a temperature slightly above the highest critical point and cooling suddenly in some quenching medium such as water or oil. This treatment produces a maximum refinement with the maximum strength.

Drawing is the heating to a temperature below the highest critical point, the temperature used being governed by the results required. This treatment is used to relieve the hardening strains set up by quenching as well as the reducing of the hardness and brittleness of hardened steel.

Maximum Refinement Above Critical Temperature

As the maximum refinement of the grain size of a piece of steel takes place at a temperature at or just slightly above the highest critical point, increasing temperatures over that point correspondingly increases the grain size. The grain size of a piece of steel is governed by the maximum temperature reached after passing over the highest critical point or by the temperature at which the last mechanical working was given the steel, providing the mechanical work was done at a temperature in excess of the highest critical point.

Annealed steels are called pearlitic, pearlite being the name applied to the microstructure of slowly cooled steels. Pearlite is a mechanical mixture consisting of alternate masses of ferrite (pure iron) and cementite (cementite being a compound made up of 6.6 per cent carbon and 93.4 per cent ferrite) with the resultant mixture containing .89 per cent carbon. Pearlite may be present in two forms, lamellar and granular; with the granular occurring either coarse or fine or elongated with bands of ferrite separating the elongated grains of pearlite.

When etched in a weak alcoholic solution of picric or nitric acid and examined under the microscope the ferrite, untouched by the etching solution, appears white, while the pearlite is shown up as a black constituent.

Proper annealing of low carbon steels causes a complete solution or combination to take place between the ferrite and pearlite, producing a homogeneous mass of small grains

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of each, the grains of the pearlite being surrounded by grains of ferrite. A steel of this refinement will machine to good advantage, due to the fact that the cutting tool will at all times be in contact with metal of uniform composition and will not be alternately coming in contact with the soft ferrite constituent and the harder carbon particles. While the alternate bands of ferrite and pearlite are microscopically sized, experience has shown that with a Gleason or Fellows gear cutter rough cutting can be traced to poorly annealed steels, having either a pronounced banded structure or a coarse granular structure. A study of the microphotographs of several of the widely used low carbon steels in gear manufacture will show the condition of the structure direct from the drop hammer, the pronounced banded structure of ferrite and pearlite and the change produced by thorough annealing.

Theoretically annealing should be accomplished at a temperature at just slightly above the critical point. However, in practice the temperature is raised to a higher point in order to allow for the solution of the carbon and iron to be produced more rapidly, as the time required to produce complete solution is reduced as the temperature increases past the critical point. Temperatures exceeding the critical point by over 100 deg. Fahr. should never be used on account of the enlargement of the grains of pearlite and ferrite. Microphotographs of a piece of steel annealed at temperatures increasing by 25 deg. from a point below the critical point to the burning point show clearly the effects of temperature on the grain size.

Annealing Temperatures

For annealing the simpler types of low carbon steels the following temperatures have been found to produce uniform machining conditions on account of producing uniform fine grain pearlite structure:

1.15—.25 Carbon straight Carbon Steel.
Heat to 1650 deg. Fahr. Hold at this temperature until the work is uniformly heated, pull from the furnace and cool in air.

.15—.25 Carbon 1½ per cent Nickel, ½ per cent Chromium Steel.
Heat to 1600 deg. Fahr. Hold at this temperature until the work is uniformly heated, pull from the furnace and cool in air.

.15—.25 Carbon 3½ per cent Nickel Steel.
Heat to 1575 deg. Fahr. Hold at this temperature until the work is uniformly heated, pull from the furnace and cool in air.

In the annealing of the higher types of chrome nickel steel, with the nickel content running about 3 per cent and the chromium about 1 per cent the operation is more difficult, as rapid cooling through the upper critical range produces a hardness due to the slight air hardening properties of steel of this composition. The annealing of this type of steel requires considerably more attention both in the heating and cooling. To produce the best machinability of this steel the following practice will give very satisfactory results:

Heat to a temperature in excess of the critical point about 100 deg. Fahr., holding at this temperature for a considerable time to allow for thorough heating and complete solution of the cementite; cool rapidly, either by pulling from the furnace into air or opening up the furnace doors, to a point at which the forgings show no color in daylight; reheat to a point just in excess of the highest critical point and cool slowly in the furnace. The temperatures, length of heating, time and rate of cooling, are dependent on analysis, size of forging and weight of the load of forgings in the furnace.

Fine Grain Steel Carbonizes More Uniformly

Not only will benefits in machining be found by careful annealing of forgings but the subsequent troubles in the hardening plant will be greatly reduced. The advantages in the hardening start with the carbonizing operation, as a steel of uniform and fine grain size will carbonize more uniformly, producing a more even hardness and less chances for soft spots. The holes in the gears will also "close in more uniformly," not causing some gears to require excessive grinding and others with just enough stock. Also all strains will have been removed from the forging, eliminating to a great extent distortion and the resulting noisy gears.

With the steels used for the heat-treated gears always of a higher carbon content, treatment after forging is necessary for machining, as it would be impossible to get the required production from untreated forgings especially in the alloy steels. The treatment is more delicate, due to the higher percentage of carbon and the natural increase in cementite, together with complete carbides which are present in some of the higher types of alloys. Due to the many analyses of heat-treated gear steel it is impossible to give in this paper specific treatments, but the general procedure is practically the same as for the case hardening, 3 per cent nickel, 1 per cent chromium steel given earlier. More time should be given to permit the complete solution to take place and the rate of cooling watched closely, together with the temperature at which the forgings are pulled from the furnace. For a furnace load, weighing 550 lb., of medium section forgings made from a steel of .50 carbon, .60 manganese, 3 per cent nickel, 1 per cent chromium the following treatment gave very good machining conditions on turning operations as well as on the Fellows gear shapers:

Heat to 1330 deg. Fahr., taking 2 hr. to heat to the temperature. Hold at the temperature for 1½ hr. and allow to cool in furnace to 1170 deg. Fahr., taking about 1 hr. to cool. Reheat to 1230 deg. Fahr., consuming ¾ hr. to reheat. Hold at 1230 deg. Fahr. for 1¼ hr. Cool slowly in furnace, not faster than 75 deg. for the first hour, until 900 deg. Fahr., then cool in air.

Poor Machining of Heat-Treated Steels

In the heat-treated steels poor machining conditions are present, generally due to incomplete solution of cementite rather than bands of free ferrite, as in the case of case-hardening steels. This segregation of carbon, as it is sometimes referred to, caused hard spots which, in the forming of the tooth, causes the cutter to ride over the hard metal, producing high spots on the face of the tooth which is as detrimental to satisfactory gear cutting as the drops or low spots produced on the face of the teeth when the pearlite is coarse-grained or in the banded condition.

In the simpler carbonized steels it is not necessary to test the forgings for hardness after the anneal, but with the high percentages of alloys in the carbonizing steels and the heat-treated steels a hardness test is essential. For this test the Brinell hardness tester is far more accurate than the sclerescope test. However, the Brinell test should not be used without the aid of the microscope. To obtain the best results in machining, the microstructure of the metal should be determined and a hardness range set that covers the variations in structure that produce good machining results. By careful control of the heat-treating operation and with the aid of the Brinell hardness tester and the microscope it is possible to continually give forgings that will machine uniformly and be soft enough to give desired production. The following gives a few of the hardness numerals on steel used in gear manufacture that produce good machining qualities:

20 Carbon 3 per cent nickel 1¼ per cent Chromium—Brinell 156-170.

50 Carbon 3 per cent nickel 1 per cent Chromium—Brinell 179-187.

50 Carbon Chrome Vanadium—Brinell 170-179.

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WE have received a copy of the Annual Report of the Institute of Metals, London, made at the tenth annual general meeting of the Institute and covering the work for the year which ended Dec. 31, 1917. It is pointed out in the report that the war has had a stimulating influence upon the activities of the Institute. During the past year the membership increased from 550 to 888. The Institute concerns itself only with non-ferrous metals.

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IT is reported from England that the Whitehead Aircraft, Ltd., has obtained Treasury sanction for an increase of its capital stock to £1,000,000. The Whitehead concern was started only after the beginning of the war, and has had a very rapid rise.

Standardization of Gearing*

American Gear Manufacturers' Association Preparing to Standardize Practice in the Branch of Industry Represented by It

By B. F. Waterman

THIS association has considered it advisable for the advancement of the gear industry to appoint, as one of its standing committees, a "General Standardization Committee," together with a number of sub-committees, to consider and develop from the mass of data which now exists in various forms, standards for use in this industry, and which will be of value to all who may have to do with gears, either as manufacturers or as users.

How many times in the course of our daily work do we have a problem to solve, the solution of which cannot be based on scientific data, for there may be none at hand, but must be based on our past experience (which may not fill the need of the moment), a good imagination (if we have one), and a guess. It is at such times that a standard method of procedure, based on similar data, would be desirable.

For instance, suppose we were called upon to furnish a pair of worm gears to give a certain reduction at a given speed to transmit a given horsepower continuously for ten hours without undue heating. How would you go about it? How would your associates go about it? This is nothing more, by the way, than a motor problem which has already been standardized.

Makers Need Broad Knowledge

It is possible that if a customer was to ask for proposals from every member of this association for a pair of spur gears to transmit a given horsepower between the motor and the machine, he would find no two alike, with the result that he would probably take the pair offered by the one he thought knew the most about a problem of this kind, or he would take the smallest pair, as they would be the cheapest, but in any case, he would not have any assurance the design he did choose was better than many of the others. Let us now assume that of a dozen proposals received our customer finds this difference of which I speak. We can readily imagine what conclusions he will draw as to our ability to design and as to our knowledge of spur gears.

Some will say immediately that "we do not make suggestions or offer proposals of this kind; we only cut gears to customers' specifications," etc. Very good, but, as time goes on, more and more will be expected of us in this direction, and we cannot entirely ignore questions like these if we are to maintain our standing, for this information can be had or can be found, if we look for it. It will also be said, "As we only make the gears and do not use them, we cannot know exactly the requirements and therefore cannot guarantee them." That is true, but we would know that what we did offer would fill certain conditions which would be stated clearly in the specifications, and if they failed we could feel reasonably sure that running conditions were not as specified. If we cannot answer these questions pertaining to our own line, how can the man unfamiliar with this business do so?

You may think that this one point has been dilated upon more than is necessary, but what has been said here is applicable to any branch of this industry; we must be ready to advise on all gear problems and be able to say authoritatively that this gear, material, method of hardening, or, if we group it into one word, design, is the best.

There are already in existence standards which are applicable to this industry, and many of the members of this association have standards of their own, based on years of experience, that might be used by all, if the modifications that may be necessary are made. There is also, in the hands of our members, enough data of a scientific nature which, if brought together and analyzed, would form the nucleus of a respectable library of standards. One of our first duties should be to collect these standards and this data.

It will be admitted that any private standard that has the merit of successful use to recommend it will lend itself to general adoption much easier than some entirely new one; therefore, we would suggest to each sub-committee that they take standards already in existence, whether in this industry or out of it, and endeavor to adapt them if necessary for general acceptance. Our reason for suggesting this is that, as stated above, they lend themselves more easily to general adoption, and, as we are at the beginning of this work, the quicker we produce some standardized result, the more easily will the more difficult problems succumb, due to our experience.

Committees have been or will be appointed to standardize the work pertaining to various sub-divisions of this business. These sub-divisions are now ten in number.

While the subjects assigned to the sub-committees differ from one another in some respects, there are a number of functions common to many or all of them and an endeavor is made here to outline some of the things that might be standardized and applied to each.

The question of quality is probably the most important one we have to consider, as quality governs price, other things being equal. What we produce must fill certain standards of quality. What these are must be determined by ourselves and the users of the gears. It would be folly for us to set standards of quality, if they do not fit the conditions of use to which the gears will be put, and there will always be conditions that any standard we make will not fit. These must be taken care of as they arise. Nevertheless, we can adopt those that will fit the majority of cases, and a gear made by members of this association should have a certain quality, this quality representing a choice of material and grade of workmanship that will be a credit to us.

Standard Specifications Recommended

To maintain and produce gears of quality and suitability, we should adopt standard specifications which should state clearly what is required of the gears in question, so that the extreme care and the time that is necessary to produce the best is not expended on work requiring only ordinary workmanship. There are now so many different materials and qualities of material that the best for each service with the proper treatment, if any is required, should be investigated.

Standards for the proportions of all types of gears might be developed to conform as nearly as possible to those now in use by our members and other large users of gears. A well-proportioned gear is essential in providing a well-designed machines and, while it is not to be expected that any one who now has patterns will discard them, such a standard would influence the making of patterns in the future. In fact, the commercial incentive to adopt our standard proportions will be supplied by the consumer asking, or even demanding, gears which embody such standards.

Many foundries now carry gear patterns and, if we were able to order castings without specifying what we wanted, we would not know whether it would be a web gear or an

*From a paper read at the convention of the American Gear Manufacturers' Association, White Sulphur Springs, W. Va., April 18-20.

arm gear, nor how many arms it would have, or their proportions.

A number of reference books have been investigated for the proportions of spur gear blanks, and it is found that they all differ, in some respects using different symbols to represent the various factors. Some call for six arms for all gears, others vary the number of arms with the diameter of the gear, and some do not consider the number of arms. It is probable that until we adopt a standard for this problem every text or reference book will offer its reader something differing from the others, in fact or at least in looks.

In speaking of looks, every engineer knows how convenient it is to work with symbols that mean the same thing day after day, and how inconvenient it is to find when looking up references in connection with some problem to find that, while each author may use the same symbol, it represents a different value from that used by another. For instance, in looking up arm proportions, it is found that for the width of arm at the hub the letters A, B and (small) h are used. Now if we want to check up or compare the results of these different formulæ we have to keep our wits about us. To overcome this difficulty, which applies to gears in general, it might be well to have a nomenclature committee to authorize a standard set of symbols to represent the factors we use.

Working limits should be adopted to assure our standard of quality, such as amount of runout permissible in the blank and in the cutting, size of hole, whether to be from standard-to-small or large, width of keyway, etc.

Standard formulæ for calculating the strength of all gears with values to cover the various factors used should be adopted.

It might be interesting to state here that John H. Cooper, in 1879, when investigating the formulæ then existing for the strength of spur gears, found 48 well-established rules for horsepower and working strength, differing from each other in extreme cases about 500 per cent. We do not think this difference would show in gears offered by members of this association, but it would be possible. It is thought that the Wilfred Lewis formula is now quite generally used, but even here the proper value for strength of material must be used, and it is thought that it devolves on the Hardening and Heat Treating Committee to furnish us with these data. The values for the strength of various material under different conditions of treatment, as published in the data sheets of the Society of Automotive Engineers, would form a good working basis for this.

Question of Wear Important

One problem that has not received the attention it should is the question of wear and, while a gear may be amply strong when considered from the breaking point, it may not be suitable as to wearing qualities. What can be done here we shall not attempt to say, but the most reliable information will come from successful examples of long-lived gears. This information might be accumulated in time, and it may be advisable to have a committee to accumulate such data. This committee might be known as a library committee. Such a committee might investigate the literature on gears, and there is much that is of great interest and which might be brought to the attention of the association by this committee. It is possible that each committee can do something along this line, as their investigations will lead them to previous unexplored sources. This subject has received some consideration, but it is doubted if any concerted effort was ever made to accumulate and analyze it. Let us now consider standards as they apply to the various sub-divisions.

Bevel Gear.—Within the last few years this type of gear has been very highly developed, due principally to a perhaps greater advance in machinery for producing them, this machinery being the invention and product of two of our member companies.

They have developed formulæ for calculating the dimensions of bevel gears, differing from the usual or standard practice. Reference is here made to the long addendum and the circular type gears, and these formulæ for calculating might be made standard, whereby all of us may calculate alike the dimensions for these gears, as their growing use for general gearing demands that long addendum or circular type gears be made to some standard and not continue to be special types as they are now. There are now, as in the past, and will be in the future, many bevel gears cut with rotary cutters, and some consideration might be given to the proper cutters to use in cutting them.

Spur Gears.—By far the most used gear, and the one that has received the most consideration theoretically and practically. Most of the theory of gearing can be studied from it, and there are more distinct methods of producing it than any other gear. For this very reason any standard adopted must be one that does not conflict with any method of production, but should be applicable to each and all of them.

Worm Gears.—Within the last few years worm gears have come into their own, and are being used to transmit greater powers at higher speeds than was thought possible previously, but even now, with this great development, the design is not based upon complete analysis. There are so many conditions that enter into the design of worm gears that it is almost impossible to design a drive with any certainty of success unless we have before us a very similar successful design.

Lack of Uniformity in Worm Gears

It would be well for the committee on worm gears to investigate the many successful drives now in existence and try to deduce some tangible working basis of design. This will not be an easy thing to do, but a start might be made toward this by getting in touch with the engineering societies. It is believed that the American Society of Mechanical Engineers have given this matter some consideration.

There is a great lack of uniformity in calculating the dimensions of both the worm and the wheel and also in the method of producing the worms, as well as in selecting the material from which to make them. To those of us who make or use hobs, it is known that the hob must be as near like the worm as possible, and oftentimes when a customer sends in the wheel to be hobbed, intending to cut the worm himself, the question will arise, especially with multiple-threaded worms, just how the worm will be cut, whether with a tool or with a cutter. And even when we know a tool was used, was it made straight-sided on the normal or on the axis? If a cutter was used, was it straight-sided or was it formed to produce a straight axial section? If made on the normal section, what tooth proportions were used, those based on the axial pitch or on the normal pitch?

The committee should look into this subject and determine upon some standard specification sheet, where all of these points will be considered.

It would be possible to develop standard formulæ for worm and wheel dimensions that would permit us all to produce similar gears under regular conditions. For instance, if we were asked to make a worm and wheel of any diameter with single thread, it is probable that all of us would make the same worm in every respect, except length, where we would probably differ, and the same wheel, except for width of face; but if we were to make a six-threaded worm, it is probable that we would not produce the same worm or wheel.

Different Methods in Use

Those who are equipped with a worm thread milling machine would use it to cut the worm and would use a straight-sided cutter, while others would use a lathe with either a straight-sided axial tool or a straight-sided normal tool. If these three methods are pursued the thread of each worm on any section would be different from the others, and any hob could be right for but one of them, the hob being made to the same system. Again, when the angle of thread with its axis becomes less than 72 degrees, it is the practice in the works of one associate to make the hob with spiral grooves, as it works better than a straight-grooved hob of this angle, and they then calculate the tooth proportions from the normal pitch.

With worms of steep angle of thread, say from 45 degrees to 60 degrees with the axis, it is best to use a greater pressure angle, as it produces better working conditions; in fact,

it is quite impossible to make a hob for a 45-degree angle of thread worm of standard depth and pressure angle. The proper length of worm and width of face of the wheel might also be investigated in this connection.

Herring-bone Gears.—It can be said of herring-bone gears, as of the others, that their greatest development has come only recently. This branch of the industry is highly specialized and any suggestions must come from others. What little experience I have had with these gears has taught me that they must be made extremely well, if they are to fill their mission properly, and the sub-committee should take the initiative in determining what degree of accuracy should be demanded.

Sprockets.—This is another highly specialized branch of gearing and out of our control, in so far as the success of the drive depends on the chain which we do not make, as well as upon the sprocket. Any work this committee does should receive the sanction of the chain manufacturers.

We know that some chain manufacturers hesitate to furnish chain to run sprockets they do not cut themselves, owing to the lack of knowledge of many who would cut the sprockets, as to how they should be cut, and they may welcome the aid that this association can give them to make more successful the use of their product.

Composition Gearing.—For many years we have been called upon to furnish gears of other material than metal, and until recently these gears were usually made of rawhide or fibre, but now the two largest electric companies have developed a fabric composition that is being used to greater extent perhaps than any of the older materials. The working standards for any of this material will be different from those used for metal, and the committee will be governed by those who are most familiar with these gears.

Asks Other Members' Aid

Gears and Pinions.—"As applied to electric railways and mine work." As the members of this committee are associated in their daily work with this type of gears, we feel that they are more competent to suggest what is applicable to these gears, and wait upon them to furnish the initiative.

Hardening and Heat Treating Committee.—This committee has it in its power to do as much as or more than any other committee to help clear the atmosphere on a most important subject. We all know that the best and most durable gears are those that are properly heat treated or hardened, and if they can suggest or develop standard methods of handling the various steels that are used for gears, they will perform a service of inestimable value to every manufacturer and user. We believe that any steel manufacturers would be glad to help them in their work, for it would be to their profit to do so.

Inspection Committee.—This committee is a most important one, for upon it devolves the duty to develop standards of inspection suited to every kind of gear. Its members should endeavor to determine the working limits to suit all kinds and sizes of gears and the method of testing them. To do this the committee, of course, should work in conjunction with each of the others, as we must consider the committee representing any kind of gear the authorities on that kind.

Consider Other Organizations

We would suggest to each committee that in working up any standard they consider carefully what the other organizations are doing along this line, so that we will not repeat, but rather add to the work already done. It is understood that the American Society of Mechanical Engineers is at present organizing a committee to act as a clearing house for all matters of standardization, and as soon as this is consummated we will be informed when the various committees can avail themselves of the aid they can give us. We believe that all of the engineering organizations will be glad to co-operate with us in this work.

We all realize that for a standard to be acceptable to all members every one must be given an opportunity to contribute toward it. It is hardly possible that any one member company, or that any committee alone can develop a standard that will fit all the conditions in the plant of the other members; therefore, they should not be expected to adopt it unless it has first been presented to them for their inspection and an opportunity to offer modifications.

The reports of all committees will first be submitted to the Standing Committee who will forward it to the secretary, who in turn will have it printed and sent to each member. The reports must be in the hands of the secretary 15 days before the meeting at which it is to be presented in order that members of the association may review it and prepare themselves for any discussion that may arise.

All Companies to Vote

After a standard has been developed by a committee, it will be approved, of course not necessarily by those who attend a meeting, but by vote in writing by all member companies. In this way any member company not represented at a meeting can express itself.

Perhaps of more importance than the standard itself is the willingness to support it after it has been approved, and as every one will be able to have some influence in the making of it, it is hoped that all will support with the least delay.

Gear Standardization Decided On

(*Continued from page* 824)

to the hobb, it should not be judged by results in individual and rather unusual cases. One thing in favor of the hobbing process was that it certainly gave production, and he was sure that with this process it was possible to obtain a greater average accuracy than with any other method. In 5 years, he would predict, the average gear maker would use the hobbing process much more than he did now. Refinements were being introduced both in the hobbing machines and the hobbs, and he was looking forward to the time when manufacturers of hobbs would make three different sets, for gears of small, large and intermediate number of teeth, respectively.

A report was handed in by the committee on straight and spiral bevel gears of which Mr. Gleason is chairman. This recommended closer co-operation between members of the association working on gears for government use. Gears for gun carriage sets and Liberty aircraft engine sets are standardized, so that any manufacturer tooled up for either of these jobs can materially assist a fellow member receiving a duplicate order. The limits of accuracy on these gears are very close, so that methods of machining and inspection are of unusual importance.

Spiral bevel gear cutting equipment heretofore has been used almost exclusively on driving gears for passenger cars, for the reason that the capacity of these machines has been hardly sufficient to meet the requirements of the motor car trade. The reduced production of passenger cars now makes it possible to use spiral bevel gear machines to a considerable extent for other purposes. They can be used to good advantage for roughing the teeth of straight bevel gears of comparatively coarse pitch and short face, as, for instance, most airplane gears. It is suggested that some missionary work should be done in helping manufacturers of all kinds of machinery who have used straight bevel gears heretofore in high speed drives to enable them to adopt spiral bevel gears.

Before adjourning a vote of thanks was extended to the Westinghouse Electric & Mfg. Co. for having furnished copies of a book of songs which was made use of at the banquet held on Friday evening. Among the speakers at this banquet were John N. Willys, who was introduced as both a manufacturer and consumer of gears, and S. L. Nicholson of the Westinghouse company who spoke on government industrial relations.

AUTOMOTIVE INDUSTRIES
The Automobile

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Uses of the Accelerometer

IN another part of this issue we print an article by H. C. Skinner on accelerometer tests. It is pointed out by Mr. Skinner that it is possible by means of the accelerometer to determine the horsepower output of an engine, and the impression is given that the accelerometer is superior to the dynamometer for this purpose. We can hardly agree with this view, however, for the reason that the dynamometer furnishes a much more direct method of determining the power than the accelerometer. It is true that snap readings of the dynamometer can be taken which will give results far beyond what the engine is capable of. But an engine characteristic drawn from such data has no more weight than one based on theoretical figures only. To obviate such subterfuges the Society of Automotive Engineers issued its standard specifications for engine tests, which require that in brake tests the engines be held at each speed for two minutes. Furthermore, the test is started at the minimum speed of stable running and the speed gradually increased, hence the possibility of momentarily adding to the regular output of the engine by drawing upon the flywheel's store of energy is entirely eliminated.

The accelerometer certainly is a most interesting instrument, but there are certain difficulties involved in its use which lessen the value of the results obtained with it. The acceleration of a car can change instantly from a definite positive to a definite negative value, and as the movable part of the accelerometer has inertia it cannot possibly follow such instant changes. It is difficult to check or calibrate an accelerometer. For this and other reasons, when the Research Division of the S. A. E. was asked to devise a method for determining the acceleration of a car, it evolved an apparatus of the recording type which measures both time and distances, measurements being taken at short-time intervals and recorded. It is a comparatively easy matter to check the accuracy of both these measurements.

The Standards Committee Division in devising its test naturally aimed at a method which would give unquestionable results, and its rejection of the accelerometer does not disprove the value of the instrument for comparative tests. For instance, in developing a new model its performance as compared with that of a previous model, or the effect of changes in carbureter adjustment, etc., on acceleration, can be accurately shown by an accelerometer test, and an accelerometer is certainly a handy piece of apparatus in experimental development work.

Parts Industry Organization

ORGANIZATION of the different parts industries is progressing rapidly. Thus we now have the Drop Forgers' Assn., the Electric Automotive Assn. and the American Gear Manufacturers' Assn. One reason why the manufacturers in these different lines are getting together is that in an unorganized industry there is a tendency for abuses of various kinds to creep in. The relations between manufacturer and customer are very complex and there are numerous possible points of friction between them. Many of these can be removed by establishing standard business methods for the whole industry. In addition to commercial subjects engineering questions are also receiving consideration. All of the men engaged in the same line are confronted by substantially the same problems and if a spirit of cooperation can be engendered in these associations much helpful information can be disseminated through them. It is a matter of give and take. There has been a tendency in the past for manufacturers to keep their experience to themselves, but they are gradually coming to realize that by making all experience gained available for general use the interests of the whole industry can be served.

A good index of the spirit which is sweeping the parts industry was furnished by the meeting of the American Gear Manufacturers' Assn. at White Sulphur Springs last week. There was absolute unanimity regarding the advantages to be gained from standardization not only in engineering matters but in commercial practice as well, and every member seemed to be willing to give his assistance.

The Necessity of Foreign Trade

By David Beecroft

NO longer can we continue to wonder whether we should develop our foreign trade or not. We must have foreign trade.

Without it we cannot become and continue a strong virile member of the first group of great nations of the world.

We must have foreign trade if our manufacturers and industries are to be as strong, robust and useful as the same industries in Great Britain, France, Italy and the Central Powers. *Our industries cannot retain such a rank on domestic trade alone.*

Whether we are interested in foreign trade or not, our present and future position as a nation dictates that we must enter the foreign trade field. The case is similar to our buying Liberty bonds. We must buy them. The case is similar to our building ships. We must build them. The case is parallel to our supplying men and sinews for war. We must furnish them.

Why?

We must have our share of the control of the raw materials of the world if we are to grow as a manufacturing nation, and we cannot secure our necessary supply of these from the other countries of the world unless we are prepared to give those countries manufactured products which they want in return for their raw products.

Consider some cases in point: We always buy from Brazil more coffee, rubber and manganese than Brazil buys manufactured products from us. In other words, our imports from Brazil are always in excess of our exports to Brazil.

This is not a healthy condition of foreign trade.

We need these raw products from Brazil. It is imperative that we have Brazil's manganese. It is imperative not only during the war, but our gradually growing steel industry will require this manganese after the war.

There is only one way in which we can be assured of an adequate supply of manganese and that is by increasing our sale of manufactured products in Brazil.

We can make a personal application of this case to our automotive industries: Manganese is needed in all our automotive products—automobiles, trucks, airplanes, tractors, motorcycles and motor boats. To get this manganese we, as manufacturers, must do our part to sell as large volumes of these products to Brazil as we can.

Manganese is essential to our national existence and position as a nation. Each industry consuming this product must consider it a part of its national duty to see that we get our due allotment. Development of foreign trade is the route of assistance.

Viewed in this way—and we cannot patriotically view it otherwise—our foreign trade duty to the nation takes on a new importance.

Instead of puzzling as to whether we should go into the foreign field or not, *we must consider it one of our duties of citizenship to carry out those functions that are essential to our national permanency.*

Foreign trade at once becomes our national duty rather than our pleasure.

Take some other cases in point: The nitrates from Chile are of prime necessity in this war. Without them we cannot have our high explosives which are as necessary as men in this war. Without them our land will not produce the crop values which we need.

Chile will sell her nitrates to those countries that can furnish her the lines of merchandise she requires. One of our national duties then becomes doing our part in developing trade with Chile to assure our future supply of these all-important nitrates.

It may be necessary to manufacture products for Chile that do not suit our home market. As good citizens it then becomes our duty to make those necessary changes to meet Chilean demands and Chilean conditions.

As a nation we require great quantities of many other raw materials, all essential to our national development and chiefly essential in the super-strenuous competition that will follow the war.

The trade in those post-war days will be for the raw materials of other lands that are needed for the reconstruction work and also needed for industries.

This foreign trade then becomes a duty of citizenship rather than a mere decision as to the scope of our business.

Latest News of the

Girl to Resign From Motor Transport Service

His Work Practically Completed, He Will Leave May 1—May Have Another Position—Horning's Duties Not Quite Certain

WASHINGTON, April 22—Momentous changes embodying complete revision of the military truck service are taking place in Washington to-day. Christian Girl, having practically completed his Washington duties, and heeding the urgent demand for his services in the industrial world, is planning to resign within the next few weeks from his position as Director of Motor Transport Service for the Quartermaster Corps.

Mr. Girl, who came to Washington last fall, and assumed charge of engineering, purchase, procurement and maintenance of the standardized war trucks, has created an efficient organization composed of skilled automobile engineers, production men and specialists. He has witnessed the beginning of quantity production of the standardized truck. Nine hundred and sixty Class B trucks have been completed and more than 1300 will be finished by the end of this month. The design and contracts for the A and AA trucks have been completely arranged for.

In consequence, Mr. Girl believes that he has completed his obligations here, which he assumed at a considerable financial sacrifice, and he now contemplates a return to his usual business affairs. He will remain in Washington, however, until a successor is appointed who can take over his work and tend to the completion of the details.

Rumors are current that Mr. Girl is going to be offered a considerably broader position, with full charge of the coordinated truck activities of the army. It is impossible to say at this time whether Mr. Girl would accept such a position or not.

Brig. General Chauncey B. Baker, who has been holding rank in the U. S. A. Reserves and has been in charge of the Motors Division of the Quartermaster Corps, was to-day appointed colonel in the National Army. Gen. Baker has asked for a transfer for active service in France, repeating a previous request which was refused on the ground that he was necessary here. For the present he still remains the head of the Motors Division.

That the Quartermaster Corps will retain control of the pooled truck activities of the army is definitely assured by the orders signed last week by Maj. General P. C. Marsh, Acting Chief of Staff. The orders, which follow, do not state whether the present organization created by Mr. Girl will be retained, or whether the standardized trucks program will be followed out. The assistant to the Quartermaster General, who will be detailed as Chief of the Motor Transport Service, has not yet been named. These various details will be announced in the near future.

The orders which so seriously affect the truck activities are in two parts—one, a special order, states:

A board of officers comprising Colonel Lucian B. Moody, Ordnance Department; Lieut.-Col. Edwin S. George, Signal Corps; Lieut.-Col. Webster A. Capron, Ordnance Department N. A.; Major A. Owen Seaman, General Staff; Major B. F. Miller, Quartermaster Corps; Major Walter T. Fishleigh, Sanitary Corps N. A., and Major Lorimer D. Miller, Engineers Corps N. A., is appointed to meet at the call of the senior member of the board at such times as may be found necessary, and at such places as may afterward be designated, to make a study of types of motor vehicles to be used in all branches of the service and to recommend to the Chief of Staff all special designs of adopted types necessitated by the peculiar requirements of the various bureaus with a view to reducing the number of types and securing the maximum interchangeability of parts.

Reports will be rendered through the Adjutant General of the Army to the Chief of Staff upon the question of types of motor driven vehicles to be adopted as standard for use in the army and such other matters relating to motor driven vehicles as should be brought to his attention.

It will be seen by this order that although the general staff is in favor of a standardization of motor trucks and motor vehicles, it does not specify the use of the standardized trucks and motorcycle already designed and some of which are in production. Until the new board is completely organized it will be impossible to learn the full meaning of this order.

The general order organizing the Motor Transport Service is as follows:

A Motor Transport Service is hereby organized as part of the Quartermaster Corps. An assistant to the Quartermaster General will be detailed as Chief of the Motor Transport Service. This officer, under the direction of the Quartermaster General, will have technical supervision of the Motor Transport Service and be responsible for its efficiency. He will coöperate with the board of officers appointed by the special order and will be governed by their approved recommendations. The functions of the Motor Transport Service are as follows:

The purchase and procurement of all motor propelled vehicles, except tanks, caterpillars and other artillery tractors (artillery tractors not to be interpreted as four-wheel drive or any other type of commercial truck) will be made by or through the Quartermaster Corps, to which will be attached from other bureaus such personnel as may hereafter be found necessary. Inspection of motor driven vehicles will be made by the Motor Transport Service with the exception of special types required by different bureaus, inspection of which may be carried on under observation of or by the bureau concerned, according to arrangements which may be made with the Motor Transport Service.

Maintenance and repair of motor vehicles of standard types, also of the approved special designs for different staff departments except tanks, caterpillars and other artillery tractors.

Technical supervision of all motor driven vehicles of all the various departments.

Organization and supply of all motor driven vehicles except as hereinafter specified. Organization and operation of a department for supplying spare parts of all motor driven vehicles and supplying gasoline lubricants and miscellaneous supplies.

Maintenance and operation of all motor repair shops and garages.

Maintenance of reserve vehicles for prompt replacement of authorized vehicles lost or destroyed and those turned into repair shops.

The Motor Transport Service has no responsibility in connection with the operation of authorized motor transport vehicles and units after their assignment by competent orders to units or to other services. All movements of such vehicles, after assignment, are under the control of tactical commanders.

Purchase of tanks, caterpillars and artillery tractors will be made by the Ordnance Department, which will confer with the Chief of the Motor Transport Service in purchasing of such special vehicles in order that the placement of orders will not conflict with orders placed by the Quartermaster Corps for other vehicles.

With the exception that this order will not affect any orders or instructions issued by the Commanding General, American Expeditionary Forces, all orders contrary to the provisions of this order are hereby revoked. This order will take effect as soon as the Chief of the Motor Transport Service informs the staff departments concerned that the Motor Transport Service is sufficiently organized to take over the work herein prescribed for it.

In addition to these many and very important changes is the vital change in the War Industries Board recently announced, by which H. L. Horning was made the supervisor of purchases for all automotive products excepting airplanes, and whose duties will now include the supervision of purchases as made by this new Motor Transport Service.

At this time it is not clear, apparently, to any Washington official as to just how Mr. Horning will collaborate with this board, but since the requirements division of the War Industries Board represents the last word in purchases, it may be assumed that after the problem is straightened out all orders which will be placed by the chief of the Motor Transport Service will receive their final approval from Mr. Horning.

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No Sanction for Accessory Show

CHICAGO, April 22—Preparations for the accessory show on the Municipal Pier in September are going ahead despite the fact that the Motor and Accessory Manufacturers' Assn. has declined to issue a sanction. It is stated that the Hardware Jobbers' Assn. will hold a convention in Chicago at the same time.

Automotive Industries

20,000 War Trucks To Be Ordered

A and AA Standardized Truck Models Are Shelved—Not Enough Ships

WASHINGTON, April 25 — Orders for 20,000 motor trucks for war purposes have been approved by the Board of Control, recently appointed to supervise truck activities. The list is made up of 8000 Class B standardized trucks; 8000 four-wheel drive trucks, which is made up of 3500 Jeffery Quads and 4500 F. W. D. In addition there are 1500 ¾-ton G. M. C. chassis, intended for ambulance work, and lastly 2500 1½-ton chassis which are to be of standard designs.

The ordering of 1500 G. M. C.'s and the 2500 1½-ton commercial chassis can be taken as an indication that the A and AA standardized trucks of the Quartermaster's Department have been effectively side-tracked and apparently permanently shelved as has been expected. It has been known for months that great opposition has been aimed at the AA and the A, as well as as at the Class B truck, by not a few manufacturers who have opposed the standardized truck program. This order is the first definite indication that these manufacturers have succeeded in blocking the standardized truck program so far as the ¾ and 1½-ton models are concerned.

While the purchase of these 20,000 additional trucks has been approved, no orders have as yet been placed.

It was expected that much larger orders of trucks would be approved, but the government has recently decided to cut 37,000 orders for war trucks off, due to the lack of shipping facilities. By cutting off this number of orders there is a conservation of $100,000,000 effected, and also the service of 50,000 workmen from now until the end of the year, as approximately that amount of help would be required to carry out a program of building 37,000 trucks.

Undoubtedly the government has shown good wisdom in thus cutting down the truck program for lack of ocean tonnage, because for several months there has not been ocean tonnage sufficient to transport abroad our trucks that have been ready for shipment. In March there were 7000 trucks waiting shipment. Early in February there were almost 3000 motor vehicles of one type or another awaiting shipment. It could scarcely be counted good policy at present to continue the production of trucks on so large a scale that they would be waiting months for shipment.

The production of standardized Class B war trucks is gaining headway. To date, 190 of these trucks have been accepted by the government. More than a week ago 455 were waiting to be accepted, this giving a total of 645 that have been completed for some weeks.

It is expected that 745 of these trucks will be assembled in April by the fourteen different manufacturers who are assembling. The assembly schedule for May ranges from 1500 to 2000, June 2500 and July 3500. The first 10,000 of these trucks were to have been completed by July 1, according to the original plan, but this date has been extended to Aug. 1, and it is expected that they will be completed about the middle of July.

On the second order of 8000 of these trucks it is said that a production of 4000 per month can be had with the same group of parts makers who have manufactured the units for the first 10,000. In the orders for the additional 8000, each assembler will have to purchase the different units wherever he desires, as it is expected government orders will be so placed that the assembler will be required to secure all of his parts and will not be limited as to the firms from which he has to purchase them. In the orders for the first 10,000 the government placed orders with specific parts makers, which will not be done in the next order.

Up to date it is reported we have shipped approximately 5000 trucks for our army in France, and that we have purchased, as previously stated, approximately 9000 trucks from our European Allies. Many of these have been Fiats, and the others have been purchased very largely from Great Britain. Apparently Great Britain has a great surplus of trucks on hand as indicated by the reduction in her orders from American factories. It would seem that our manufacture of trucks for our Allies would practically end about the first of the year.

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Stocks Drop on Curtailment Rumor

NEW YORK, April 25—Although reports that passenger car production would be further curtailed are unfounded at present, the stock market reflected the uneasiness which some manufacturers have felt. Several stocks broke sharply, Maxwell leading the decline with a drop of 4⅜. Others which registered declines were: Chandler 2½, General Motors 1½, Studebaker 1¾.

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Saxon Interests to Meet

NEW YORK, April 25—It is understood that within a few days there will be a meeting in Detroit of persons interested in the Saxon Motor Co. It is stated that a plan for the reorganization of the company is afoot.

Curtailment Report Is False

Apparently Based on Interview with Baruch—No Meeting Has Been Held

WASHINGTON, D. C., April 24—The report circulated from Washington yesterday to the effect that there had been a meeting of the automobile makers held here and that an additional cut in the production of automobiles had been decided upon is false.

There was no meeting of automobile representatives held here. The War Industries Board has not taken any action along this line. It has been known for some time that a meeting of the automobile makers with the War Industries Board is to be held, when a further reduction in the production of automobiles covering the year of 1919 will be agreed upon.

Yesterday's story which has created an unusual amount of consternation in Washington and throughout the industry, as evidenced by telegrams received from various manufacturing centers, apparently is due to an interview between Chairman Bernard M. Baruch, of the War Industries Board, and a local newspaper man.

The question of the next curtailment in the industry will be considered by the committee, headed by W. C. Durant. This committee will meet on April 29, at which time it will take up with George M. Peck, the industrial representative of the War Industries Board, and also with P. B. Noyes, the representative of the Fuel Administration, the question of restriction.

It is understood in some circles that a cut of 20 per cent in production may be agreed upon. While no definite dates covering this are announced it is understood that it would naturally follow the present cut of 30 per cent which covered the period up to July 31. It would be reasonable to infer that any further cut such as 20 per cent would follow July 31.

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Detroit Doubts Rumor

DETROIT, April 24—Manufacturers here do not take much stock in newspaper reports that passenger car production is to be put at 25 per cent of normal July 1. If this is the case they say they would have received authentic information from Washington. However, should there be foundation to the reports many manufacturers will suffer great hardships. It will close them up unless they

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Airplane Standards Discussed

Churchill Tells International Conference in London Experience Is Main Essential

NEW YORK, April 24—News has come from abroad of the first meeting of the Interallied Conference on Aircraft Standardization, the convention for which a large delegation left the United States several months ago and part of which returned recently. The American delegation was composed of F. G. Diffin, chairman of the Aircraft Standardization Board; Dr. W. F. Durand, Lieutenant Commander D. Briscoe, Coker F. Clarkson, E. H. Ehrman, Charles M. Manley, James Hartness, Dr. A. L. Coby, F. G. Ericson, Captain A. Tilt, Dr. F. R. Baxter and Lieutenant L. Selden.

Welcomed by Minister of Munitions

The delegates to the conference were welcomed by Minister of Munitions Churchill and by Sir Maurice Fitzmaurice, vice-chairman of the British Engineering Standards Committee. Mr. Churchill's address infers that the Engineering Standards Committee will take over the technical work formerly done by the technical department of the Ministry of Munitions. He considered it wise that general standardization of aircraft design had not been entered upon before a great deal of data and experience had been accumulated. One advantage of the allies, he said, was that they had the world to draw upon for materials, and by developing these resources to the fullest extent they would be in a position to dictate to their opponents. Mr. Diffin, chairman of the American delegation, said that the United States was wholeheartedly in the war and the sole desire of the country was to attain the best possible results for the common good. He agreed that the opportunity for standardization in aircraft work was better today than at any previous time.

Conference of Great Value

Sir William Weir, Director General of Aircraft Production, said he had come to the conclusion that the best results would be achieved by carrying out standardization under the direct supervision of the Engineering Standards Committee, in view of the wealth of experience in standardization work generally possessed by that body. He said he felt sure that the conference would be of the highest value to the aircraft program of the allies generally.

Addresses will be made during the preliminary functions by Colonel Dorand, chief of the French delegation, and Deputy Giuseppi Grassi, head of the Italian delegation, who expressed the desires of his colleagues to co-operate fully in the work of standardization.

The technical sessions of the conference were presided over by Sir Henry Fowler, Assistant Director General of Aircraft Production and chairman of the Sectional Committee of the Engineering Standards Committee, which is immediately concerned in carrying out aircraft standardization in Great Britain. A large number of officers of the Department of the Air Ministry took part in these sessions, in addition to the members of the various delegations.

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Four De Martini Truck Models

SAN FRANCISCO, CAL., April 19—The De Martini Motor Truck Co. is now offering 4 models of worm-driven trucks of 1, 2, 3 and 4-ton capacity. All 4 units are equipped with Buda engines, Brown-Lipe clutches and Brown-Lipe gearsets mounted in unit power plants, and Sheldon worm-driven rear axles. The 1-tonner has a 3¾ x 5⅛ engine, the 2-tonner a 3¾ x 5½, and the 3 and 4-tonners a 4¼ x 5½. In the chassis the 1-tonner sells at $2,250, the 2-ton unit at $2,750, the 3-tonner at $3,650 and the 4-ton model at $4,250.

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Detroit Loan Subscription $52,157,175

DETROIT, April 23—The total subscriptions to the third Liberty loan here have already reached a sum of $52,157,175, and the executive committee expects that these figures will be increased to $55,000,000. This will be a 50 per cent oversubscription, and the largest amount of money ever raised in the history of the city. Factory employees alone subscribed $20,200,000. The orginal quota was $36,000,000.

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Power Truck Marketing Products

DETROIT, April 24—The Power Truck & Tractor Co. has been incorporated with a capital stock of $2,500,000 to manufacture 1-, 2-, 3½- and 5-ton trucks, in which standard units will be used. The company will also manufacture two tractor models. The 1-ton model the company has adopted is now being placed on the market, having been in use for a year and a half.

The personnel of the company will be announced later. A factory building has been purchased in Detroit with facilities for turning out several thousand trucks and tractors a year. The company plans to build 3000 trucks and 3000 tractors during 1918.

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Shelby Tractor Gets Government Order

SHELBY, OHIO, April 24—The Shelby Tractor & Truck Co. has received a Government order for 150,000 shells.

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Edwin O. Wood Dies

PASADENA, CAL., April 22—Edwin O. Wood, assistant to W. C. Durant, president of the General Motors Corp., died here yesterday. He was born in Michigan in 1861 and spent most of his life in Flint. Besides his activities in the automobile industry, Mr. Wood took part in politics, being a member of the Democratic National Committee from Michigan for two terms. The degree of doctor of laws was conferred upon him by the University of Notre Dame.

Tire Prices Raised 10 Per Cent

Practically Every Company Has Announced Increase—Most Effective Immediately

DETROIT, April 24.—Almost without exception, tire companies have increased the prices of tires and inner tubes from 10 to 15 per cent, effective, in most cases, immediately.

The Goodyear Tire & Rubber Co. has advanced all prices 10 per cent, effective immediately.

The B. F. Goodrich Co. has advanced all prices 10 per cent.

The Miller Rubber Co. will increase all prices 10 per cent on May 1.

The Firestone Tire & Rubber Co. has advanced the prices on non-skid and fabric tires from 12 to 15 per cent, and on plain tread tires and inner tubes 10 per cent.

The United States Tire Co. has increased the price of all automobile tires and tubes 10 per cent, with the exception of Nobby Tread tires, which remain the same. Pneumatic truck tires have also been increased 10 per cent. No advance has been announced on solid truck tires.

Kelly-Springfield prices remain unchanged, but an increase of at least 10 per cent is expected shortly. It is believed that this will not be a straight increase, but will vary according to the product.

The Michelin Tire Co. has increased the prices of inner tubes and 3-, 3½- and 4-in. tires 10 per cent, and 4½- and 5-in. tires 5 per cent.

The Batavia Rubber Co. will increase the prices of all tires and tubes 10 per cent on May 1.

The Empire Rubber & Tire Co. has increased prices of all tires and tubes 10 per cent.

The Ajax Rubber Co. has increased all prices 10 per cent.

The Fisk Rubber Co. has increased the prices of all tires and tubes 10 per cent.

The Republic Rubber Co. has increased the prices of automobile and truck tires and inner tubes 10 per cent.

This general advance has been necessitated by the big increase in the price of fabric goods, which during the last two years has amounted to about 200 per cent. Another cause is the inability to get ships to transport the cotton used in the manufacture of casings. Almost all of this cotton is imported.

England some time ago placed an embargo which curtailed shipment of rubber goods to the United States.

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May Continue Regal Business

DETROIT, April 23—Creditors of the Regal Motor Car Co. met yesterday to decide whether to continue the Regal business or liquidate it. No decision was reached, and the matter was put into the hands of a committee, which will analyze the situation and make a formal report in a few days.

M.A.M.A. Appoints War Service Committee

Directors, at Meeting, Name A. W. Copland General Chairman —$5,000 Voted to Aid Standardization Work of S.A.E.— Payment of Taxes in Installments Advocated

NEW YORK, April 20—At the meeting of the board of directors of the Motor and Accessory Manufacturers' Assn. held yesterday, a War Service Committee was appointed to serve as an additional point of contact between the Government and members of the association. A. W. Copland, president of the Detroit Gear & Machine Co., will be general chairman.

Membership of the committee will include the chairman of each of the groups of the association as follows: B. F. Tobin, president of the Continental Motors Corp., chairman of the Motor and Motor Parts Group; A. R. Domery, vice-president of the Timken-Detroit Axle Co., chairman of the Drive Group; Christian Girl, chairman of the Chassis Group; J. M. Gunn, president of the United States Tire Co., chairman of the Tire and Tire Accessories Group; and H. J. Hayes of the Hayes Mfg. Co., chairman of the Body Group.

It was decided at the meeting to send a delegation to the "Win the War for Permanent Peace" Convention to be held by the League to Enforce Peace at Philadelphia, May 16, 17 and 18. The delegates chosen to represent the association include C. W. Stiger, A. W. Copland, William M. Sweet, Atwater Kent, Henry P. Jones and J. A. Bower.

No More Accessory Shows

The question of sanctioning additional accessory shows was brought up at the meeting. The directors decided that this was no time for further expansion, due to the conditions created by the war, and that members of the association should conserve rather than expand. It is possible that a tractor show may be sanctioned later, but nothing definite was decided on.

A sum of $5000 was voted toward the support of the American Automobile Assn. for good roads and legislative work, and a similar sum for the support of the standardization work of the S. A. E.

Urge Quarterly Tax Payments

The directors present voted that the best effort of the association be used to advocate the payment of income and excess profits taxes quarterly, and recommended that every member of the association work personally toward this end. The following telegram was sent to Secretary of the Treasury McAdoo in connection with this propaganda:

Secretary of Treasury William G. McAdoo,
Washington, D. C.

At a recent meeting of our Board of Directors it was unanimously recommended that income and excess profits tax laws be amended so that installment payments may be made, thus eliminating the danger of a financial panic by the sudden withdrawal of these funds from the banks at one time. It would further prove an incentive for Liberty Bond buying, and unquestionably save many of our members the necessity of borrowing. Undoubtedly there are many manufacturers and merchants who are not in position to increase their credit at this time. It was therefore recommended that you be asked to use your influence to have the taxes and corporations made quarterly.
The Motor & Accessory Manufacturers' Assn.

It is believed by the directors that the views of all the members coincide with this message.

W. C. Rands Resigns

W. C. Rands resigned as a director of the association, as a result of the stress of the war work that the Motor Products Co., of which he is president, is doing. He will be succeeded by A. W. Copland.

It was decided to hold the second annual convention of the credit managers of the members at Atlantic City on May 20 and 21. C. W. Stiger, president of the M. A. M. A., will preside. A preliminary program has been drawn up providing for a business session each day, at which the following subjects will be discussed:

Trade Acceptances from the Banker's Viewpoint; Trade Acceptances from the Buyer's Viewpoint; Airplane Activities; Trade Conditions of the Present Time; Trade and Economic Conditions After the War; Financing of War Order Production, and Government Disbursements—How to More Readily Collect Accounts.

The business sessions will be held from 10.30 to 1 p. m. and from 2 to 4 p. m. A war banquet will be held May 21 and a golf tournament follows the second business session each day.

Several Men From Each Firm

It has been suggested that members of the association send not only their credit managers, but also as many representatives as they wish. M. C. Dittman, vice-president and treasurer of the American Bronze Corp., has been appointed chairman of the committee of arrangements for the convention, and William M. Sweet will take charge of the golf tournament.

The following new members were elected to the association:

Whitman & Barnes Mfg. Co., Akron.
National Tube & Mfg. Co., St. Louis.
Walden-Worcester, Inc., Worcester, Mass.
J. & D. Tire Co., Charlotte, N. C.
Torbensen Axle Co., Cleveland.

The alien labor committee, consisting of Albert Champion, chairman, William C. Rands and George Edmunds, gave their report, recommending that work for finding spies and forming home defense units in the factories of members be urged. No action was taken, but Mr. Champion was asked to appear before the executive committee at its meeting on May 17 and further advocate this work.

The directors who attended the meeting last Friday were C. W. Stiger, C. E. Thompson, E. H. Broadwell, T. J. Wetzell, Christian Girl, L. M. Wainwright, E. W. Beach and William M. Sweet.

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Trial Airplane Mail Flights Planned

WASHINGTON, April 22—The aerial mail service between Washington and New York will start early in May, and several trial flights will be made before this date. The hangars, airplanes, landing fields, etc., are all provided and ready now.

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$188,042,969 Voted for Naval Aviation

WASHINGTON, April 22—Congress has passed the Naval Appropriation Bill, which includes $188,042,996 for naval aviation.

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2300 Unfilled Saxon Orders

DETROIT, April 24—The Saxon Motor Car Corp. has 2300 unfilled orders on its books. The inability to fill them is mainly due to the lack of raw material and parts.

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Iowa and Ohio Buy Ford Tractors

DEARBORN, MICH., April 23—Iowa and Ohio have each purchassd 1000 tractors from Henry Ford & Son on the same basis as Michigan, viz., $750, f.o.b. Dearborn. There are now 5 states which have bought tractors from this company. Six thousand have been sent to Great Britain, and a Canadian order for 1000 tractors has not yet been filled. The first shipments to Ohio and Iowa have left the plant a few days ago, and it is expected both will be completed almost simultaneously within 30 or 40 days.

The entire country is asking for tractors, according to an official of the company, and it is a question which state will place the order next.

Fordson tractors in Ohio will not be handled by agents, but only by the Bryant Tractor Co., Columbus, to which application must be made. A practical demonstration of the machine will be given soon on the Ohio State University farm.

Ford has presented a club of Boy Scouts at Washington with a tractor. The boys will cultivate garden plots with it. It is believed that as quickly as one field is worked the boys will send the tractor to another.

The company is now producing 100 tractors a day, and in 60 days expects to double this output.

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Used Car Business Less

DETROIT, April 23—The Detroit retail branch of the Studebaker Corp. did more than $50,000 worth of business during March. In the used car department there were 300 cars on the floor during the winter; at the present time the supply has been decreased to 150 cars. Owing to the inability to get enough new cars to trade in, the used car business has dropped slightly. Light used cars are in greater demand than the heavier models.

S. A. E. to Exhibit War Devices

Summer Meeting Will Have Airplane Engines and Other Apparatus—Special Flying Program

DAYTON, O., April 22—Complete plans have been perfected for the 2-day summer meeting of the S. A. E. to be held in this city Monday and Tuesday, June 17 and 18. Half of the meeting will consist of demonstrations of different types of automotive apparatus designed especially for war use. The other 50 per cent of the program will be given over to popular papers dealing with new designs of automotive apparatus for the war.

There will not be the usual program of heavy technical articles, as it has been deemed more desirable to make the session of broad educational value and give the members an opportunity of examining airplane engines, different models of airplanes, etc.

The meeting will be held in Triangle Park, which consists of more than 400 acres in the outskirts of Dayton, and is in the immediate vicinity of McCook Field, the Government experimental station for aviation design, in charge of Major Howard Marmon. The society will have the exclusive use of Triangle Park for the two days and sessions will be held in the large pavilion, which has a capacity for seating several thousand persons.

The demonstrations will include the various aviation engines, among which are all of the German types, such as Mercedes and Benz. The exhibit will also include French aviation engines, with Renault, Gnome, Garrone and Hispano-Suiza made by different countries. There will be such British engines as Rolls-Royce, Sunbeam and perhaps others. There will also be an opportunity of examining the German planes which have been captured, as well as French and English planes.

Among other exhibits of special interest will be demonstrations of machines for manufacturing airplane propellers in operation. There will be demonstrations, with explanation, of synchronizing machine guns which fire between the blades of propellers on fighting planes. There will be demonstrations of formation flying over some of the big Dayton fields, as many aviators will be there at that time.

The program includes demonstrations by many other war departments, which will be announced later, as some of the details in connection with these have not been completed.

On Monday evening, June 17, will be held the annual summer dinner at the pavilion in Triangle Park. There will be seating accommodations for approximately 1000 or more, if desired, at this dinner. Tickets at $3 each are now on sale at New York headquarters of the S. A. E.

Hotel accommodations are being handled directly by the different hotels, of which Dayton has half a dozen. There is a special Dayton S. A. E. committee, which is giving its complete attention to this work, and between the hotels and one or two other places it is hoped to accommodate over 1000 members and guests. The Dayton committee is being handled by F. H. Hoover, 137 North Ludlow Street, who is acting as secretary.

Members should write direct to the Dayton hotels for reservations. This list of hotels includes Miami, Holden, Algonquin and Beckel. In addition to these it is planned to accommodate many members at the Country Club and also at St. Mary's College.

From the starting of the daily sessions at 10 o'clock until the completion at night the entire program will be carried on at Triangle Park, where luncheons will be served each day. There are ample garageing facilities at the park.

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Ship Repair Parts Before Trucks

WASHINGTON, April 24—The Quartermaster Corps is arranging to have repair parts for standardized trucks abroad, prior to the arrival of the trucks themselves. One thousand complete sets of repair parts have already reached the depot at Baltimore and will soon be shipped abroad. It is expected that 10,000 complete sets of repair parts will be sent to France in the next few months preceding the shipment of the Class B standardized truck.

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Service Truck to Increase Output

WABASH, IND., April 25—The Service Motor Truck Co. is erecting two new buildings, which are nearing completion. When these are in operation, the plant will have a capacity of 20 trucks a day. With further additions, soon to be started, the estimated output will be 50 trucks a day.

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Says Oil Shortage Threatens Country

WASHINGTON, April 19—A serious shortage of fuel oil threatens this country according to Congressman Green of Massachusetts. The Congressman states that the chief oil fields of the United States in Kansas, Oklahoma and Texas, with 50,000 wells, producing 450,000 barrels of oil daily, have suffered a decrease of 82,000 barrels per day since October, 1917. He added that the second largest field, that of California, with 7800 wells and a normal production of 90,000,000 barrels a year has decreased 10,000,000 barrels. Wyoming, a new field with 400 wells, is averaging 40 barrels per day. The old Appalachian region with 99,000 wells is yielding 63,000 barrels per day.

Summing up, the Congressman finds that the 200,000 oil wells of the United States are producing 300,000,000 barrels per annum while our requirements for ships, submarines, destroyers, etc., will soon be 425,000,000 barrels per year.

The Congressman is endeavoring to secure terms with Mexico to provide the necessary additional fuel oil. In a speech before the House he showed that Mexican fields are producing far more fuel oil than we require but owing to what he claims is German interference and German propaganda we have been unable to secure the oil.

One single oil well in Mexico owned by the Mexican Peroleum Co. has produced 66,000,000 barrels of oil since 1910, and its pressure is undiminished. A company owning these wells and many others, with a production running into hundreds of thousands of barrels of oil per day, is only producing 55,000 barrels per day, owing to a lack of shipping facilities. The English company in Mexico produced 15,000,000 barrels last year, all of which was consumed by the British navy.

The Mexican Government has produced in detail an estimated potential production from drilled wells of 1,350,000 barrels per day. In view of the absolute necessity for fuel oil, and the large requirements of this country and the Allies, Congressman Green urges the United States to interfere and ascertain the difficulties with Mexican oil production and the means for increasing the production and securing the oil for the United States.

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S.A.E. Metropolitan Section Meets

NEW YORK, April 25—Industrial applications of the track-layer type of tractor were discussed at the April meeting of the S.A.E., Metropolitan Section, which was held at the Automobile Club of America Bldg., last night.

The speaker of the evening was B. R. Tewksbury of the Industrial Department of the Cleveland Tractor Co. After having shown a number of views of the Cleveland tractor doing different kinds of work, Mr. Tewksbury showed some motion pictures of military and industrial applications of the track-layer type of tractor. These included pictures of a new tank used by the French army, the design of which differs materially from that of a well known British tank. It looks more like a regular farm tractor of the track-layer type with a large box mounted on the axles, in which the crew is stationed. This tank was shown fitted with a pointed ram and also with what looked like a vertical knife, for clearing away different kinds of obstructions. The motion pictures of the industrial applications of the tractor showed the tractor in use in construction work building army camps, etc., drawing loaded trucks or trailers, in some instances through mud hub deep, cutting ice and clearing roads of snow. The discussion was limited.

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Urge Truck Expresses

WASHINGTON, April 24—State Defense Councils have been urged by the Council of National Defense to promote the use of rural motor truck express lines. The importance of war advantages,

including quick marketing of farm produce, together with details of benefits already secured from routes in operation, are outlined in a circular which has been sent to all State Council Councils of Defense.

Advantages of Truck Service.

1. Production is stimulated. Farmers invariably increase the variety and quantity of their production when regular marketing facilities are made available. In every section studied, a great increase in the variety and the amount of production followed the establishment of the rural express.

2. The farmers are relieved of their task of hauling their products to market, and the existing farm labor supply is thereby greatly conserved. The investigation shows that in some places the hauling done by five men with wagons can be done by a man wieh a truck at many times the speed. This leaves the farm laborers at work in the fields.

3. Additional food is made available by tapping the farm communities which have no other good shipping facilities. Much of this additional food is now either wasted or greatly deteriorated because of poor shipping facilities.

Rural Express Especially Needed.

Rural motor express is especially needed now when labor is scarce and food demands are high. Farmers and merchants alike enthusiastically favor the system. In many farm communities where the rural express is in operation the farmers state that an interference with this service would immediately result in reduced production.

As the first step in the establishment of this necesssary service, we urge that you make a survey of the rural motor-truck express lines already in operation in your State, as follows:

1. Obtain the names of the operators of the rural express lines in the vicinity of your larger cities through the chambers of commerce, motor-truck agencies, State agricultural extension service, and the State highways department, and from these operators secure and record the information asked for letter of transmittal is inclosed. The agencies mentioned above will be quick to assist your committee in this work.

2. Mail to all customers whose names will be secured on form "A" the questionnaire inclosed as form "B." A suggested letter of transmittal is also inclosed.

3. Forward to us the names o fthe operators, together with the termini of their routes, as secured on form "A," as soon as you have addressed form "B" to their customers. This information we want immediately for the Bureau of Markets of the Department of Agriculture.

It is important that this work be done promptly as the agricultural year is well under way, and if the rural motor express is to perform its fullest service, farmers must be able to count upon its help this year. Will you, therefore—

1. Return within the next week the inclosed franked questionnaire as to the name and membership of your committee and your plans for this survey. Should your transporeation committee not have a member particularly interested in highways transportation, we suggest that you delegate this matter to a special committee, which should include the representative of the State agricultural college, the State highways department, and State chamber of commerce.

2. Mail all information obtained from the returns to Forms A and B to State councils section of the Council of National Defense on or before May 5.

The highways transport committee will at once goover this material as a basis of further recommendations. Do not wait for these recommendations, however. As soon as the survey is complete proceed at once to secure the organization of such rural motor express lines as are proved necessary in your State. Use the data obtained in the survey in planning this work.

S. A. E. European Delegates Return

Desirable Airplane Co-operation with Allies Obtained—Good Progress in Europe

NEW YORK CITY, April 25—The special representatives of the Society of Automotive Engineers who went to London in January to take up with the British, French and Italian engineers the work of developing international airplane standards have returned and report that their work was vastly more satisfactory than they even anticipated. The party included C. M. Manly of the Curtiss Airplane Co. and a pioneer in aviation, F. G. Diffin of Washington, who has had the work of airplane standardization in hand; E. H. Ehrman of Chicago, who went as an authority on screw-thread standards; F. G. Erricson, chief of airplane engineering for Canada; Coker F. Clarkson, general manager of the S. A. E.; James Hartness and Lieutenant Commander Benjamin B. Briscoe. The last mentioned did not return with the party.

The mission found standardization in Great Britain greatly in advance of what was anticipated, and as a result airplane production has jumped ahead with remarkable strides in Great Britain. That country is to-day producing more airplanes than France. The airplane standardization work is centered in one government official, who has a sub-committee of engineers advising in the work. This centralization of control has resulted in special progress.

As a result of the various conferences which continued for practically three weeks much progress was made. It is hoped to improve specifications of metals so as to increase production.

The question of international screw-threads was only partly achieved, as it will be necessary for further action not only in this country but in Europe.

The mission visited practically all of the airplane engine and plane factories in England and France, where every courtesy was extended and every facility offered for the securing of information. The Britishers made no effort to conceal any secrets wit hregard to production or engineering. Their attitude was one of complete co-operation, and it is hoped that America will lend great co-operation by way of furnishing raw materials and giving other co-operation with the British airplane program.

Complete reports from the different members of the party will be made to different Government departments and also to the S. A. E. Already results have begun to show themselves by way of accelerated shipments of raw material and other co-operation.

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Truck Men Hold Dinner

PHILADELPHIA, April 20—The Motor Truck Association of Philadelphia held a highly successful dinner, minstrel show and dance at the Hotel Adelphia roof garden. The entertainment was known as an "Army and Navy Minstrel Show," some thirty members of the association taking part and LeRoy G. Peed, manager of the Willys-Overland Co., New York, was guest of honor and interlocutor. The entertainment committee consisted of R. Arthur Bittong, chairman; H. B. Armstrong, J. P. Cranton and W. W. Heindel. John D. Howley, president of the association, was largely instrumental in the production and so was Harry M. Staton, for he presided at the piano, in addition to being director.

The end men were R. Arthur Bittong, C. R. Miller, Thomas K. Quirk and Charles H. Grakelow. Soloists and songs included the following: "Over the Ocean Blue," B. B. Bachman; "Must You?" C. R. Miller; "What Are You Going to Do to Help the Boys?" A. E. I. Jackson; "Smile, Smile, Smile," M. H. Robertson; "Song of the Turnkey," W. S. Dowdell; "They Go Wild, Simply Wild Over Me," Thomas K. Quirk; "Keep the Home Fires Burning," H. B. Armstrong; "Song Boy," R. Arthur Bittong; "When the Boys Come Home," E. J. Strunk. There were also harmony selections and songs by the entire company. The sailors were enacted by B. B. Bachman, William H. Bray, F. B. Browning, G. J. Gundefinger, Harry Fahling, W. W. Heindel, A. E. I. Jackson, R. E. Kauffman and L. H. O'Neal, while the soldiers' parts were taken by H. B. Armstrong, W. S. Dowdell, J. D. Howley, J. Nelson Perry, M. H. Robertson, George Shearer, E. J. Strunk, E. W. Taxis and C. K. Whidden. The Vacuum Oil Co. furnished the program as a complimentary advertisement.

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Chandler Earnings Large

CLEVELAND, April 25—The Chandler Motor Car Co. manufactured 2000 passenger cars during the first quarter of 1918, as compared with 4400 in the corresponding period last year. Earnings of the company for the last 3 months are estimated at the annual rate of $26.75, before the deduction of war taxes. In spite of reduced production, since the Chandler company depends on passenger car manufacture entirely for its profits, the proportionate earnings amount to 2½ times the $12 annual dividend rate.

The company will continue to depend on passenger car production for its earnings in the first half of the current year. In the third quarter, part of these will come from tractor manufacture. The company has a $10,000,000 tractor order from the Government.

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Italy Building Large Airplanes

NEW YORK, April 25—Italy is building Caproni airplanes capable of carrying 1200 lb. of bombs and 5 or 6 machine guns, according to Lieut. Leopold Belloni, of the Italian Aviation Corps, who arrived recently in this country. A high rate of speed is being maintained in their construction, he said.

To Curtail Rubber Imports

War Trade Board Will Issue Order Soon—Tire Business May Be Affected

WASHINGTON, April 22—Imports of raw rubber to this country will be curtailed by an order of the War Trade Board which will be issued in the near future. The order will also curtail importation of other articles, and will be known as the second import embargo list. It is designed to create more available shipping tonnage for traffic between this country and France.

The curtailment of rubber imports will probably be the most important action of the new order, and will affect to a considerable degree the automobile tire business. Imports of rubber for the last five years have increased 400 per cent, and an immense shipping tonnage is now devoted to this business.

Inasmuch as the automobile industry has agreed to a 30 per cent curtailment of passenger car manufacture, it is anticipated that the curtailment of rubber import for tire manufacture will be somewheres in the neighborhood of this figure.

It is understood that the order will refuse licenses to importers of the better grades of rubber from Java and the Far East. Rubber imports from South America will be continued, but these will be insufficient, and it is anticipated that after the large reserve rubber stocks in this country are exhausted American tire makers will be forced to produce tires of less durable material.

The Shipping Board, following its conference with importers of rubber yesterday, arrived at prospective terms which were not made public and which will be discussed in conference with the War Industries Board. When the final agreement is reached, it will be turned over to the War Trade Board for ratification and announcement.

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Limit Rubber Shipping Space

WASHINGTON, April 22—It is understood that the Shipping Board has practically decided upon a definite curtailment in the amount of shipping space which will be permitted for the importation of rubber. This was practically decided following the hearing which was held in Washington last week between representatives of the Shipping Board and of the various large rubber consumers of the United States. The amount by which tonnage space will be limited has not been definitely established. It is stated that the complete plan of the Shipping Board will be made public within the next two weeks.

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Minnesota Agrees to Prevent Strikes

ST. PAUL, MINN., April 22—A wartime agreement to prevent strikes and lockouts in Minnesota has been drawn up by the Minnesota Public Safety Commission and signed by the heads of the State Federation of Labor and the Minnesota Employers' Assn. This provides that all differences between employers and employees shall be referred to the State Board of Arbitration, and that work shall be uninterrupted pending settlement of difficulties. The agreement insures continuance of all work in automobile, truck, parts and tractor factories, as well as garages, repairshops and all other lines affecting the motor trade.

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Exhibits American Zeppelin

WASHINGTON, April 20—Alfred Herbert, Montclair, N. J., yesterday exhibited and demonstrated a 16-ft. model of an American made Zeppelin before the Senate Naval Committee and other naval officers. The length of the full sized dirigible is 700 ft. and its diameter is 70 ft. It is designed for passenger use and will carry 50 men. The Zeppelin, which is claimed to be non-sinkable, is built in 23 separate gas sections and is equipped with four 600 hp. gasoline engines which drive 8 propellers. It has a speed of 65 to 70 m.p.h.

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$1,000,000 for Canadian Roads

MONTREAL, CANADA, April 22—The Government has appropriated $1,000,000 for road work. According to Auguste Tessier, provincial minister of roads, this will be used as follows:

Montreal-Quebec Road	$150,000
Three Rivers-Grande Mere Road	131,000
Edward VII. Blvd.	22,000
Sherbrooke-Derby Road	11,000
Chambly Road	4,000

The remainder of the appropriation will be used to repair roads in the various municipalities.

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Texas Crude Oil Activities Increase

AUSTIN, TEXAS, April 22—Crude oil production in Texas for 1918, according to reports, will be much greater than that of 1917, largely as the result of the development of new fields. In the new "oil horizon," as it is called, in the middle western part of the state, wells have been found recently with a daily output of from 1000 to 2000 barrels at a depth of 3000 ft.

Several companies have announced additions to refining and pipe line facilities in Texas. The Odessa Oil & Refining Co. has purchased a site at Ranger for a refinery. The Texas Co. plans a pipe line from West Dallas to Ranger, thence to Brownwood, a distance of more than 200 miles. The Wichita Valley Refining Co., Iowa Park, has increased its capital to $500,000 and will enlarge its refinery. The Prairie Oil & Gas Co. will build a refinery at Ranger, and lay a pipe from Cushing, Okla., to Ranger. Other pipe lines and refineries will be built by the Sinclair Oil & Refining Co., the Gulf Production Co., the Magnolia Petroleum Co. and the Empire Gas & Fuel Co.

Gasoline Shortage a Myth

Requa Says Supply Is Sufficient for Domestic Needs as Well as Those of Our Allies

WASHINGTON, April 20—There is no immediate danger of a gasoline shortage in the United States, according to Mark L. Requa, director of the Oil Division, U. S. Fuel Adminstration.

Mr. Requa states, "There has been considerable discussion as to cutting off the supply of gasoline to passenger vehicles following the precedent set in England, but the conditions are entirely dissimilar for the reason that England produces no oil, and relies entirely upon imports from overseas. The United States, on the contrary, not only produces the oil for its own consumption, but large surplus quantities for export. It is quite obvious that the oil facilities of the United States must be used in such a way as to produce the maximum benefit viewed from a national standpoint to meet the existing crisis.

"Total stocks in the United States approximate 160,000,000 barrels as of Jan. 1. Last year's production approximated 320,000,000 barrels and there was a draft on stock of 20,000,000 barrels. There is ample oil territory available in various parts of the United States. It is only a question of drilling to secure it.

"The chief difficulty in the oil situation is lack of transportation facilities. Gasoline as a by-product of fuel oil used in industry in the navy and other important military activities will continue to be produced in greater quantities than ever. Crude oils are dangerous for fuel use so long as they contain gasoline. Consequently until the gasoline is removed fuel oil cannot be used, and unless the gasoline produced is sold and used, there will be an inclination on the part of producers to curtail production of fuel oil with an increase in its price. For this reason the Fuel Administration encourages the consumption of gasoline in motor vehicles."

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Chicago Trade Subscribes $500,000

CHICAGO, April 20—The Third Liberty Loan speedometer bulletin of the Chicago Automobile Trade Assn. has already registered more than $500,000 worth of bonds which automobile men have sold to their employees and bought for themselves. The association, which is handling the drive in the automobile trade of Chicago, issues a bulletin every other day. This represents a speedometer dial, and the pointer is advanced to show the progress of the drive. Below the dial are listed the names of companies whose employees have bought bonds, and the percentage of these purchasers to the total number of employees. It is proposed, after April 25, to list the names of companies in the Automobile Trades division which have made no sales.

Government Taking Steps to Conserve Tin

Shortage at Serious Stage—Embargo Placed on Exports of Tin Plate and Articles Containing Tin—Automobile Industry Used 3000 Tons in 1917

DETROIT, April 22—Steps now being taken by the government to conserve supplies of pig tin emphasize the seriousness of the tin situation. Manufacturers of solder, white metals and bearing metal were summoned by the raw tin division of the War Industries Board to Washington this week to discuss tin conservation.

In March, the war trade board imposed an embargo on exports of tin plate and other articles containing tin, except those for the Allies. The mobilization of our army and the maintenance of our expeditionary forces are increasing the need for tin plate for food containers and other purposes to an extent not generally appreciated, while other classes of war work are also increasing demand.

Nearly all our supplies of pig tin must be brought from the East Indies, which means a long ocean voyage.

Pig Tin Imports

The following table shows the imports of tin into the United States in gross tons during the last few years, the approximate consumption of tin in tin plate manufacture and the ratio of such consumption to tin imports:

	Pig Tin Imports	†Tin used for tin plate	Percentage tin imports thus used
1918.....	‡51,312	*33,000	*64
1917.....	64,116	*30,000	*47
1916.....	61,636	24,700	40
1915.....	51,623	21,118	41
1914.....	42,433	18,624	44
1913.....	46,554	16,474	31
1912.....	51,787	19,259	37

‡On the basis of first quarter imports of 12,828 gross tons.
†On the basis of 2 lb. of tin per 100 lb. of tin plate.
*Estimated.

Some of the figures in the above table are estimates, but they clearly show the tendency. Either imports of tin must be largely increased during the remainder of the current year or consumption materially reduced.

Stocks Dwindled Quickly

Stocks of the white metal in the United States had dwindled to 134 tons on April 1, as compared with a daily consumption of about 174 tons, and as against stocks in other years of from 3000 to 4000 tons. Such spot tin as can be picked up is selling at about 90 cents a pound and up, as compared with 51½ cents a year ago.

That the government is undertaking to increase supplies is indicated by recent reports that it has been a large buyer of Straits tin in the primary market at Singapore. That it is endeavoring to curtail consumption is shown by the current meetings of consumers in Washington.

Imports of tin in 1918 undoubtedly will be increased to a volume considerably more than the indicated figure of 51,312 gross tons, which is based on first quarter imports. Accordingly, the percentage of tin supplies consumed in the tin plate industry will be reduced to considerably less than 64 per cent. But immediate and effective action is imperative if essential industry is not to be handicapped by a shortage or a famine of tin.—*The Iron Trade Review.*

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Automobile Industry Used 3000 Tons of Tin in 1917

The automobile industry used during 1917 approximately 3000 tons of tin. This was used principally in babbitt and for soldering. The Ford radiator uses 2½ lb. of solder to each radiator, half of which is tin, or 5 tons a day. With an output of 800 radiators, with only 1¼ lb. of tin to the radiator, the total amount of tin used was 1,000,000 lb. The Dodge radiator, which is also a tubular type, uses 2¾ lb. of solder to each radiator, which is 40 per cent tin, 60 per cent lead solder. At the rate of about 60,000 radiators during the year, using 1¼ lb. of tin, the amount consumed totaled 75,000 lb.

Continental Uses 100 Tons Yearly

The largest cellular types of radiators use 8 lb. of solder, of which a maximum is 4 lb. of tin. The Continental Motors Corp. uses, roughly, 100 tons a year. Estimating the truck output for 1917 at 100,000, and with the average truck radiator using 2¾ lb. of tin, the total amount consumed by the truck industry represents 275,000 lb.

The recapitulation at the bottom of the page will give an idea of the amount of tin consumed in the automobile industry during this past year.

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Start Night Driving of Truck Trains

WASHINGTON, April 19—Night driving of motor truck supply trains from the Middle West to the Eastern seaboard has just been started by the Motor Division of the Quartermaster Department as a means of training drivers for service in France.

A division supply train of 38 cargo and two tank trucks left Detroit last night on its 600-mile eastward journey. The truck companies will travel entirely independent of the country tribe. Camps are to be made at the proper hour, no matter what destination is reached, with the exception that open country will be selected rather than cities. Cooking utensils, food, tents and all the necessary equipment to make the truck companies self-contained are provided.

Driving of motor trucks in regular formation from factory to seaboard has proved to be an important part of the training program. Each motor supply train will make two trips. The first trip will be by day and the second by night, so that the drivers will have opportunity to accustom themselves to the conditions of both operations. It is expected that night driving will decrease the present day-time traffic congestion found on some of the highways.

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New Road to Link Detroit and Pontiac

PONTIAC, MICH., April 22—Petitions for a new concrete highway from Pontiac to Detroit have been filed with Oakland County and state officials. The route selected is out Auburn Avenue from Pontiac, and enters Detroit via John R Street, east of the Ford factory. It is expected that this route will divert traffic from Woodward Avenue, which passes through Royal Oak and Birmingham. It is probable the work will not be started until next season.

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Plan Intermediate Return Loads Service

WILMINGTON, DEL., April 22—Motor truck companies handling freight between New York, Philadelphia, Wilmington, Baltimore and Washington are trying to establish an intermediate return loads service. Stops are being made in many cities along the route, where merchants are interviewed and arrangements made for handling freight. Other trucks going through the cities bear large placards inviting the patronage of the townspeople.

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Cadillac Prices Increased

DETROIT, April 22—The Cadillac Motor Car Co. has advanced the prices of many models as follows:

Model	New Price	Old Price	Increase
Open Cars.			
7-Pass.	$2,970	$2,805	$165
4-Pass.	2,970	2,805	165
2-Pass.	2,970	2,805	165
Closed Cars.			
Brougham, 5-Pass.	3,840	3,650	190
Victoria	3,365	3,205	150
Chassis.			
125-in.	2,490	2,345	145
132-in.	2,570	2,425	145
145-in.	2,610	2,465	145

Prices of limousines, imperials, landaulets, town limousines and town landaulets remain the same.

Amount of Tin Used in Car and Truck Radiators

	Estimated Output of Cars 1917	Pounds of Tin Used Per Radiator	Total Pounds Used
Ford	800,000	1.25	1,000,000
Dodge Brothers.....	60,000	1.25	75,000
All others.....	740,000	2.5	1,850,000
Trucks	100,000	2.75	275,000
			3,200,000

Want More Help for War Work

Toledo and Cleveland Organize War Industries Commission to Increase Co-operation

TOLEDO, April 24—Toledo business men and manufacturers have formed the Toledo War Industries Commission for the purpose of co-operating more efficiently with the Government. The commission will make an immediate survey of manufacturing companies here, and estimate the possibilities of their production, so that bids can be made on war work by the commission as their representative.

Factories will be classified and war work will be allotted to all plants, small and large, which are equipped to handle it.

The officers of the commission are: President, Thomas A. D. Devillbiss, president of the Devillbiss Mfg. Co.; vice-president, Walter Stewart, of the Close Realty Co.; secretary, Frank G. Saxton, of the Commerce Club, and treasurer, William C. Carr, vice-president of the Second National Bank.

There are at present 10 divisions in the committee, each with a chairman:

Automotive Division: Royal R. Scott, Willys-Overland Co.
Chemicals, Oils and Paints: C. A. Ulsh, Paragon Refining Co.
Machinery and Machine Products: R. A. Stranahan, Champion Spark Plug Co.
Textiles and Clothing: L. S. Ottenheimer, Cohen, Friedlander & Martin Co.
Wood and Leather: Aaron Kelsey, Kelsey & Freeman Co.
Wholesalers: Charles Feilbach, Feilbach Co.
Retailers: H. S. Fisher, W. L. Milner & Co.
Bankers: E. H. Cady.
Real Estate: Roy R. Blair, Palmer Blair Co.
Toledo Commerce Club: Gustavus Ohlinger.

The objects of the new organization are to help the Government get greater production, aid the manufacturer in getting contracts and find employment for labor released through the slowing down of ordinary manufacture.

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CLEVELAND, April 14—The Cleveland War Industries Commission has been formed by local manufacturers to organize all the industries of this city into one unit as a means of giving more efficient help to the Government, presenting to government officials intelligently the products manufactured here and keeping Cleveland informed of what the Government wishes to buy.

A sales and engineering force has been established at Washington. This bureau will not negotiate contracts, but advise the Government of Cleveland's facilities for manufacturing needed products.

The officers of the commission are: Chairman, J. H. Foster; vice-chairman, T. S. Grasselli; treasurer, C. A. Otis, and secretary, W. E. Tousley.

The executive committee is composed of the following: Chairman, J. H. Foster, president of the Hydraulic Pressed Steel Co.; T. W. Grasselli, vice-chairman, president of the Grasselli Chemical Co.; E. E. Allyne, president of the Aluminum Castings Co.; E. N. Fairchild, president and treasurer of the Cleveland Milling Co.; E. R. Fancher, governor of the Federal Reserve Bank; A. W. Henn, president and treasurer of the National Acme Co.; J. H. Herron, president of the Cleveland Engineering Society; Charles A. Otis, Otis & Co.

The commission is divided into several groups, including castings, forgings and stamping, engineering, automotive and machinery and machine products groups.

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To Standardize Size of Catalogs

DETROIT, April 24—A meeting of the catalog committee of the National Association of Purchasing Agents will be held in Chicago on May 22. It is expected that definite steps will be taken to start a campaign for a standard size catalog to be used by all purchasing agents throughout the country. The size 8½ x 11 in. has been tentatively fixed and is already used by several national organizations.

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Gasoline Higher in Detroit

DETROIT, April 24 — The price of gasoline has been increased 1½ cents a gallon here. The new price, which became effective April 18, is 23.2 cents a gallon, as compared with the former price of 21.7 cents. The price of kerosene has been raised from 11.2 cents a gallon to 12.2 cents.

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Dealers To Train Men

ST. LOUIS, April 22—To guide dealers in war-time efficiency the War Service Committee of the National Antomobile Dealers' Assn. has worked out certain recommendations which President F. W. A. Vesper has made public. These cover the conservation of man power and the elimination of waste, and such service work as may be rendered unnecessary by proper education of car owners. They also provide for the training of men by dealer associations in the various cities, so that more skilled workers may be available for Government service.

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Detroit Street Car Strike Delays Work

DETROIT, April 25 — Thousands of workmen employe din munitions and automobile factories were unable to get to work yesterday because of a street car strike. The Department of Labor has already taken steps to settle the strike. Most of the motor car plants sent cars and trucks to and from the factories for their employees. The Cadillac company gathered together 75 per cent of its normal force, the Hudson company 80 per cent, Dodge Brothers 85 per cent and Ford and Paige each had 90 per cent.

Bosch Plants Taken by Government

Action Was Result of Investigation Which Showed Plant Was Enemy-Owned

WASHINGTON, April 23—The Government has taken over the plants of the Bosch Magneto Co., Plainfield, N. J. The property is valued at $7,000,000. This action followed a Government investigation which showed that the company was enemy-owned. Another cause was the unwillingness of the directors of the company to manufacture material to be used in the war against Germany. The corporation manufactures magnetos for airplanes, automobiles and truck and other army and navy equipment.

Alien Property Custodian A. Mitchell Palmer is now in charge of the Bosch property, and has made the following official announcement:

"Prior to the entrance of the United States into the war, this company refused to take orders from the Allies, and after the United States went in, it was loath to render any service to the Government in its activities against the 'Fatherland.'

"The directors to be appointed by the Alien Property Custodian will immediately take charge of the works. They will be operated in full by the United States, and the entire product be placed at the disposal of the Munitions committees. As this is one of the best equipped plants in the country, its output will be of inestimable value to both the army and navy.

"After the examination conducted by Francis P. Garvin, director of the Bureau of Investigation, an examination which is tracing the ownership of many properties in various parts of the country, all the capital stock of the Bosch Magneto Co. has been proven to be owned by Robert Bosch and other residents of Germany. When first reported by Carl L. Schurz of New York City as president in December, 1917, he claimed that all but a small proportion was owned by residents of this country. At the time of the declaration of war, Otto Heins, who was then president, and many of the German heads of departments with the purpose that this concern should not be used in making war upon Germany. The present directors are Carl Schurz and Gustav Jahn. They will be replaced by others to be designated by the Alien Property Custodian."

The action is not entirely a surprise, in view of past events. Last June the Bosch company issued the following statement with regard to the war situation:

"Ever since the entry of this country into the war, various rumors affecting the Bosch Magneto Co. have been in circulation, a number of them finding expression in print. It has been stated, for example, that the factories of the company were about to be closed down, that the company has been taken over by the Government, etc. It has been stated in print and otherwise that the Plainfield Works are to close down immediately. This is not true, for while the production of starting apparatus will be suspended, for the present, the company's orders and further prospective business indicate the necessity of continuing the Plainfield works as an auxiliary in production to the manufactory at Springfield.—C. L. Shurz, President Bosch Magneto Co.".

The Bosch company was formed in the summer of 1906, by Otto Heins, who was elected president. In June, 1914, the company purchased the Rushmore plant at Plainfield, N. J., and started the manufacture of starting and lighting products in addition to magnetos. In June, 1917, it was decided to discontinue the starting and lighting products and concen-

trate on magnetos. This decision followed the resignation of Heins and several other executives, as well as a large number of mechanics, all of whom were German subjects with property in Germany. Another factor causing their resignation was a Government order forbidding enemy aliens to come within ½ mile of a munitions factory, and although the company was not manufacturing munitions, the entry of the country into the war placed its products in the same class.

A. H. D. Altree, vice-president of the company, resigned last October, to take effect Jan. 15. Victor Kliesrath, chief engineer, resigned about the same time.

It was at that time that the plant at Plainfield was closed down, and is now vacant except for a few gas generators which were not removed.

Joseph A. Bower, head of the business department of the Custodian of Alien Property, has been designated to represent the Government on the board of directors.

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Advance-Rumely to Make 3000 Tractors

BATTLE CREEK, MICH., April 25—The Advance-Rumely Co. will manufacture 3000 oil-pull tractors this summer, as well as boilers for the United States Shipping Board, in addition to its regular schedule of manufacture. This will necessitate the employment of 50 more boilermakers and 800 mechanics.

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Continental Buys Property in Muskegon

MUSKEGON, MICH., April 25—The Continental Motors Corp., Detroit, has purchased a block of property here which will add 34 acres to the Muskegon property of the company. This brings the total to more than 50 acres. No plans have been prepared yet for immediate expansion, but it is considered likely that the Continental plant will be enlarged in the near future.

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To Name Labor Administrator

WASHINGTON, April 23—A national Labor Administrator, to have charge of all labor problems involved in the production of war supplies, will me named by President Wilson soon. Duties now performed by various labor bureaus in the Government departments which have to do with war materials production will be taken over and co-ordinated by the new officer.

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Building Aerial Post Hangars

NEW YORK, April 25—Work has been started at Belmont Park, Queens, on the construction of two hangars for airplanes of the Aerial Post, the air mail service which will be put in operation about May 15. The hangars, which will be of the type being sent abroad, are built by the Claiborne Co.

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Colonel Thomas Dimond Dies

NEW YORK, April 25—Colonel Thomas Dimond, president of the Dimond-Apperson Automobile Co., died Monday in his sixty-fourth year.

Government Analysis of Labor

Detroit Situation Reaches Acute Stage—Shortage Will Reach 35,000 Men

DETROIT, April 23—The labor problem in Detroit is one of great magnitude. From a present shortage of 20,000 men it is expected this will grow to one of 35,000 within the next six months. Because of the great demand for labor the local manufacturers have been obliged to advertise in the liner section of the daily papers. Instead of this helping the situation it has become worse. The men, knowing they can always get work elsewhere, are influenced by this advertising to leave their present places and seek other ones where they think they can get more money. This has caused a still greater demand because the floating labor has resulted in reducing the number of working hours.

This has prompted a visit by a representative from the Detroit Board of Commerce to Washington to place the matter before Government officials. While there it was also intended that he get an angle on the reason for a number of large contracts for local companies being held up.

Despite the large number of plants that are busy almost to capacity on war orders there are many smaller ones that have facilities for handling much of this work. The representative also took this up with the Government officials. As a result of this visit, the Government will send representatives here from Washington to analyze the labor situation and the facilities of the various factories for handling more work for the purpose of supplying them with orders.

The Government will establish a Federal employment bureau in Detroit, according to a statement made by Charles T. Clayton, assistant director of the United States employment service, Department of Labor. This bureau will endeavor to line up all skilled workmen in Detroit and make certain that they are employed where their services are of most value. The bureau will also prevent serious shortage of skilled labor in the munition plants of Detroit if the manufacturers themselves will co-operate. When the bureau is established manufacturers will be urged by the Government to get in immediate touch with it so that they may be assured adequate labor supply.

Should any skilled workmen be drafted, the Government desires manufacturers who need them to put in exemption claims and follow them through.

Arrangements are now under way to have Government contracts in this locality handled by the district ordnance division. Whenever the Government will have any contracts to award, if it is known in Washington that this territory has facilities for handling it, the matter will be sent to this district to be taken care of, either apportioning the order to a number of smaller companies or giving one company the entire contract; this will be left to the direction of the local district. On competitive contracts, however, the matter will be handled as heretofore, in Washington, except that this district, the same as others, will have an opportunity to present its bid.

Heretofore contracts were placed in the East as much as possible to eliminate transportation, but now that this section is pretty well filled up, the West can be given a greater opportunity. Detroit is second in its facilities for working on Government contracts.

It is reported that 50,000 southern negroes are headed north to supply some of the labor demand. These, of course, will not all come to Detroit.

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Production Cut in Detroit and Territory

DETROIT, April 23—Manufacturers are still sending out cars overland to nearby points, but drive-aways to more distant sections have been materially reduced owing to the temporary relief of the freight congestion on outgoing shipments. The Paige-Detroit Motor Car Co. has reduced its drive-aways 50 per cent, as a number of others have. The Dort Motor Car Co. drives away 40 per cent of its production and the Oakland 50 per cent. Dealers are coming to Dodge Brothers faster than the company can supply them.

The daily production of the manufacturers in this territory is very unsteady, fluctuating according to the amount of materials and parts available. Taken as a whole the output has had a marked decrease. This lack of sufficient materials and parts to work is caused by the inability to get them to the place where they are to be fabricated. Although the outgoing shipping is in a better condition a great deal of difficulty is still experienced on incoming freight, this, to a great extent, being the controlling factor in the production schedules. The other element that is retarding production is the want of labor.

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To Refinance Smith Motor Truck

CHICAGO, April 23—Boston and New York banking interests have bought a controlling share in the Smith Motor Truck Co., maker of the Smith-Form-A-Truck. Plans for refinancing the company and putting it on a sound financial basis have been formulated, according to an official of the organization. No immediate change in personnel, however, is anticipated.

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Martin Factory Almost Ready

CLEVELAND, April 23—It is expected that during the week the Glenn L. Martin Co. will move to its new plant on a 68-acre tract on the Nickel Plate Railway. The site was leased for 99 years.

The company has been housed in temporary quarters up till now. During the war the company will make only air-

planes for the Government, but after the war will go into extensive production of commercial airplanes.

The field adjacent to the plant is sufficiently large to be used for flying and testing purposes. The first unit of the building is 220 by 300 ft., and costs about $200,000. A second unit will soon be put under way, increasing the floor space to 216,000 sq. ft.

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Explains Import Restriction

WASHINGTON, April 22—The War Trade Board has issued the following explanatory announcement on imports:

Licenses for ferromanganese, lead and spiegeleisen will be granted only for shipments coming overland or by lake from Canada or overland from Mexico.

Licenses for talc and soapstone will be granted only for shipments coming from Canada.

Licenses will be granted only for glass and glassware, not including lenses and optical goods, for shipments coming overland or by lake from Canada, over land from Mexico, or as return cargo from European countries and then only when shipped from a convenient port and loaded without undue delay.

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Republic Truck Output Doubled

ALMA, MICH., April 23—During the 9 months ending April 1 the Republic Motor Truck Co. built and delivered 11,400 trucks, as compared with 5900 trucks during the corresponding period last year. The company's schedule of production at present is 80 trucks a day, or an approximate output of 2000 per month. Cash receipts for the 9 months ending April 1 were $12,000,000, as compared with about $6,000,000 for the same period of a year previous.

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Perlman Rim Stockholders to Meet

JACKSON, MICH., April 23—A special meeting of the stockholders of the Perlman Rim Corp. has been called for May 10 to vote on a resolution adopted by the directors advising the sale of the property and assets of the company to the United Motors Corp.

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Coleman Tractor in Production

KANSAS CITY, April 22—The Coleman Tractor Corp. is now in active production in the tractor field, and has started distributing its products. A new factory is being erected, which will be ready by June 1. Production will then be increased to 4 tractors daily.

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New Winther 1-Tonner

WINTHROP HARBOR, ILL., April 22—A new 1-ton internal-gear-driven truck has just been added by the Winther Motor Truck Co. The newcomer sells at $2,250 for chassis, and is fitted with a Wisconsin 3¼ by 5 engine having a Borg & Beck dry-plate clutch, with a Brown-Lipe 4-speed gearset mounted amidships and a Clark internal-gear-driven rear axle with the springs arranged to take the torque and propulsion on the Hotchkiss plan.

Automobile Crating Satisfactory

Cars Exported to South America Usually Well Packed and Arrive in Good Shape

CINCINNATI, April 19—A compliment was paid to the automobile industry at the Fifth National Foreign Trade Convention here yesterday when Grosvenor M. Jones, assistant chief of the Bureau of Foreign and Domestic Commerce, who has made a 13-months trip inspecting the ports on the east and west coast of South America, classed the automobile makers among the most careful and best packers of merchandising going to Latin America.

The majority of old established American firms such as the Singer Sewing Machine, Standard Oil, Columbia Phonograph, Eastman Kodak, Pittsburgh Plate Glass, nearly all of the automobile concerns, and more than a score of other American houses are packing their goods in excellent form for all South American countries, according to Mr. Jones.

There is a second group of American firms which are not crating their goods so well, and which crate them in the same way for the west and east coasts, although conditions differ greatly.

There is a third class of American shippers who crate their goods poorly, and it is this class which has given to America a bad reputation as to the quality of packing and crating its goods for export. The bad packing leaves an unsavory reputation, but the good packing is not noticed as being different from European packing.

There are three reasons why our goods should be well packed for Latin American trade. They are:

1—The goods arrive in better condition when properly packed.

2—Delivery of the goods is speedier when properly packed because there is no delay in order to make appraisals for damage due to broken crating or pilfering.

3—The final cost of the shipping is really reduced.

A good article must be well packed, so that when the Latin American removes the crating, the finish is not damaged nor any of the parts deranged. He takes a particular pride in opening goods that are in a perfect condition. Time is the essence of most business transactions. This is especially so with regard to foreign trade, and good packing always conserves time and custom delays.

Packing cases should be built from blue prints and made as carefully as possible. The product should be knocked down as much as possible, thereby conserving space and reducing shipping rates and insurance. The more goods are knocked down, the better it suits the Latin American buyer.

Greater care must be exercised in packing for the west coast of South America than for the east coast or the Amazon. Owing to the Andes being close to the west coast, there are few protective harbors, and the ocean liners unload on to lighters. On this coast there is generally a strong southwestern breeze which sometimes upsets the lighters. There is no good protection against rains, and cases often remain for several days exposed on lighters or on sea walls. This calls for packing that is water and moisture proof.

Sections of the west coast differ greatly in the matter of moisture. In Ecuador, where there are tropical torrents, special precautions must be taken. There is also a wet zone in the southern portion of Chile. Between these sections there is practically a rainless area, which extends from the southern part of Ecuador to Coquimbo, and in this zone the same care is not necessary.

Some of the ports along the western coasts require stronger packing and crating of goods than others. Thus, Antofagasta requires specially heavy cases, as loading conditions are very unfavorable, and in addition, there are no storage facilities and a great deal of pilfering.

Compared with the western coast, the eastern coast of South America has modern harbors with cement sea walls alongside of which the ocean steamers are lashed. Paralleling the sea wall is a row of unloading cranes. Immediately back of these is the railroad track, and next come elevators and storage warehouses. Such modern equipment is found at Buenos Aires, Bahia Blanca, Montevideo, Santos, Rio de Janeiro, Pernambuco and Para in the Amazon. Because of this modern line of eastern ports, the same degree of careful packing is not so essential as on the west.

—

Jerome to Address Detroit S. A. E.

DETROIT, April 22—H. M. Jerome, chief engineer of the Chalkis Co., Detroit, will give a talk on the history of developments of gun manufacture at the meeting of the Detroit section of the Society of Automotive Engineers, to be held Friday, April 25, in the Hotel Pontchartrain convention hall.

—

Kissel Drops One Model

HARTFORD, WIS., April 22—The Kissel Motor Car Co. has discontinued the manufacture of its ¾-ton bevel-driven Flyer delivery vehicle. In its place it has added a new worm-driven 5-tonner called the Dreadnaught, with a chassis capacity, including the body, of 11,800 lbs.

—

Bridges Motor to Erect Factory

FORT WORTH, TEX., April 25—The Bridges Motor Car & Rubber Co. is clearing a site of 289 acres and will erect a factory within a few months. Several buildings will comprise the plant.

—

110 Saxons Daily in March

DETROIT, April 22—During March the Saxon Motor Car Corp. turned out and shipped 110 cars a day.

Lighting System Coming from Western Electric Co.

NEW YORK, April 22—The Western Electric Co., with offices at 195 Broadway, is placing on the market a new farm lighting system which with a 90 amp.-hr. battery sells for $325, and with 180 amp.-hr. battery for $585. Both prices are without the gasoline engine.

Both outfits have a 700-watt generator, storage battery and a switch panel, 5 x 10 in., incorporating an automatic regulating device. The switch panel is equipped with an ammeter and a single-pole double-throw switch for starting the engine and controlling the lights. All terminals are at the back of the panel, which is made of Munson slate and fully fused. The regulator governs the charging current supplying a tapering charge.

It is planned later to market a 500-watt and a 1050-watt outfit. Engines can also be supplied.

—

Rowe Motor Moves Plant

EAST DOWNINGTON, PA., April 20—The Rowe Motor Mfg. Co. has moved its offices and plant to their new quarters at Lancaster, Pa.

—

Fisk Rubber Sales Increasing

CHICOPEE FALLS, MASS., April 22—The Fisk Rubber Co. and its subsidiary, the Federal Rubber Co., Milwaukee, did 33 per cent more business during March, 1918, than in the same month last year. It is estimated that the two companies will do a gross business of $50,000,000 this year.

—

Capital Increase

WILMINGTON, DEL., April 22—The Gray Motor Co. has increased its capital stock from $550,000 to $1,000,000.

—

New Era Tire Carriers for Ambulances

GRAND RAPIDS, MICH., April 22—The New Era Spring & Specialty Co. has received a government order for 1000 tire carriers. These will be used on Dodge Brothers ambulances in foreign service.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

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More Quartermaster Contract Awards

WASHINGTON, April 22—Contracts have been awarded by the Quartermaster Corps as follows:

April 9—
- Anchor Top & Body Co., Cincinnati; bracket assemblies.
- Gramm-Bernstein Co., Lima, Ohio; skid chain anchor hook.
- Hayden-Corbett Chain Co., Columbus, Ohio; skid chains.
- Walker Mfg. Co., Racine; jacks.

April 11—
- Brown-Lipe Chapin Co., Syracuse, N. Y.; standardized army truck differentials.

April 12—
- Timken-Detroit Axle Co., Detroit; M. & S. differentials.
- American Chain Co., Bridgeport, Conn.; skid chains, 40 x 6.

April 13—
- Detroit Lubricator Co., Detroit; clutch release bearing oiler assemblies.
- Steel Products Co., Cleveland; spring bolts, castle nuts and cotter pins.
- Empire Brass Mfg. Co., Cleveland; clutch release bearing oiling assemblies.
- Standard Parts Co., Cleveland; spring bolt spacers.
- Kales Haskel Co., Detroit; plain washers.
- Crowe Name Plate Co., Chicago; 18 gauge tire plates.

—

Lane Truck to Increase Production

KALAMAZOO, MICH., April 24—Preparations are now being made by the Lane Motor Truck Co. to greatly increase production of 3-, 5- and 7-ton worm drive trucks. They will all be fitted with electric lighting, high tension magneto, electric starting, cabin curtains, windshield, bumper and regulation chassis equipment.

Reo Truck Output Doubled—Further Increases Promised

LANSING, April 22—Truck production of the Reo Motor Car Co. for March was 735 as compared with 325 in March, 1917. The present output of 50 trucks a day will be increased. On April 15 the sales department was 1119 trucks behind orders.

—

National Twist Drill Adds

DETROIT, April 22—The National Twist Drill & Tool Co. has a 4-story addition to its factory.

—

Menominee Truck in New Plant

MENOMINEE, MICH., April 22—The Menominee Motor Truck Co. is operating at full capacity in its new factory, which consists of the former group of the Richardson Shoe Co. The buildings have been remodeled for truck manufacture. The 1917 output of 500 Menominee trucks will be more than doubled in 1918, according to the company's estimates.

—

Victor Talking Machine Gets Airplane Contract

WASHINGTON, April 22—The Victor Talking Machine Co., Camden, N. J., has received a government contract for thousands of hydroplanes for the navy. By June 1, production is expected to reach 2 planes daily. Five thousand employees will be engaged in the work.

—

99 Per Cent of Firestone Men Buy Bonds

AKRON, OHIO, April 24—Ninety-nine per cent of the employees of the Firestone Tire & Rubber Co. have subscribed for bonds of the Third Liberty Loan. In 51 of the 60 factory departments, 100 per cent of the employees bought bonds, and the same was true in 35 of the 48 office divisions. The total subscriptions thus far are $562,500, and orders for bonds continue to come in.

—

Dividends Declared

The Nash Motors Co. has declared a regular quarterly dividend of $1.75 a share on preferred stock, payable May 1 to holders of record April 20.

General view of the plant of Henry Ford & Son where the production of Fordson tractors is now being carried on

Industrial Review of the Week

A Summary of Major Developments in Other Fields

Expect Excellent April Iron and Steel Production

Operating conditions at blast furnaces and steel works have improved steadily. The leading producer in the Pittsburgh district had 96 per cent of its rated blast furnace capacity active last week and 98 per cent of its Bessemer and open-hearth steel capacity. While all companies did not do so well, it is probable that April production of both pig iron and steel will exceed the excellent showing made in March.

These results will attract more than usual attention now that the Government is calling for an increasing proportion of the output. The Carnegie Steel Co. is now giving war requirements practically 100 per cent of its rolled product and at other Central Western plants 75 to 90 per cent of the shipments are on Government account.

Surprisingly little is heard of hardship to any metal-working industry because steel mills are paying small attention to ordinary trade. Stocks are playing a part now that will be missed later. But there is no doubt of the gradual shrinkage of consumption in less essential lines.

Bolt and nut manufacturers have been much in conference lately. Of 129,000,000 bolts wanted by the Government to send abroad 25 per cent will be shipped promptly from stock and the remainder will be put in process soon. About 75 per cent of bolt and nut and rivet capacity is just now on war work.

The sheet bar shortage has grown worse and because of the large amount of sheet output going to the Government fully 50 per cent of the capacity is out of the market. A large order for galvanized sheets is pending and one for painted corrugated sheets may run to 75,000 tons.

As an example of shifting from work for the Allies a plant at Cleveland has just finished a large contract for shells for France begun in 1916, and is now turning to a similar contract for the Government at Washington.

Car scarcity is still pronounced, particularly in the South, where tens of thousands of tons of pig iron which the buyers need accumulates at furnaces. Merchant stocks in Alabama were fully 250,000 tons on April 1.

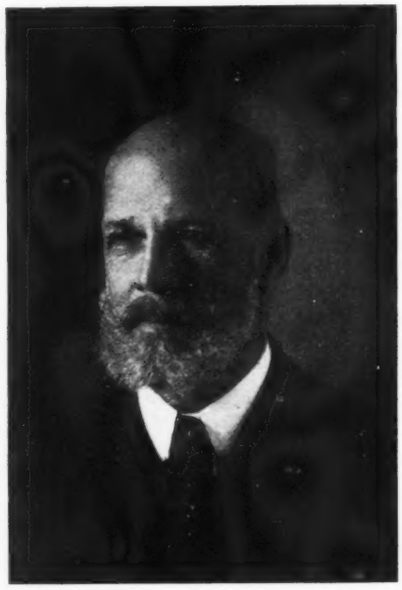
The prohibition of ferromanganese imports effective May 13 suggests that along with the curtailment of the manganese ore movement from Brazil there is danger that the margin of safety may be cut too fine.—*Iron Age.*

—

Curtailment Report False

(*Continued from page* 833)

be fortunate in getting Government contracts which many believe they would arrange to handle. Some say the reports mean that this year's business will be left undisturbed, allowing manufacturers to continue contracts they now hold. If curtailment was intended to take place July 1 all manufacturers who have large contracts with parts manufacturers and sources of material will have to pay for these supplies, consequently tying up much capital without being able to use supplies. If curtailment is planned for next year's business most plants can easily be converted on war basis and keep forces organized. Distributers will be affected, despite its unauthenticity; a number of plants feel alarmed over the report, and hope it will be unnecessary to cut production too much. Large plants, such as Ford and Dodge, will not be affected. A good share of their organization is on war orders, and they can easily equip the balance of plants to like work. Ford assembly plants would be loaned to the Government if necessary.



COLONEL GEORGE POPE

President of the National Association of Manufacturers and Treasurer of the N. A. C. C., who died April 19

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Schwartz Truck Ready for Production

READING, PA., April 25—The Schwartz Motor Truck Co., which was recently incorporated here and has started manufacturing in the building of the Central Motor Car Co., will start marketing 1½- and 2½-ton trucks within 30 days. The 1½-ton chassis will sell for $2,000 and the 2½-ton chassis for $2,500. The trucks will have Continental engines, Brown-Lipe transmission, Timken bearings, Perfection springs and Torbensen internal gear axles. The company will make 3½- and 5-ton trucks later.

Harry B. Schwartz, head of the Central Motor Car Co., has been elected president of the new company.

Labor Shortage Prevents Maximum Coal Production

No change of any consequence can be noted in the coal situation this week. Shipments of anthracite show a slight improvement. The scarcity of labor in the hard-coal regions prevents the mines from working to utmost capacity, and the draft is making still further inroads on the men who are left. The situation is serious.

The steam-coal market has tightened noticeably, and there is an urgent demand for practically all the smaller sizes. The Fuel Administration's order curtailing the supplies of coal to pottery and brick manufacturers would indicate that a sharper line will be drawn between so-called essential and nonessential industries.

The bituminous situation continues to preserve its demoralizing aspect. Inquiries for soft coal are many, with deliveries inadequate. Though production for the week ended April 13 was 10,947,000 tons, an increase of nearly 18 per cent over the output of the week preceding, it must be remembered that there was a decided falling off in production for the week ended April 6. In order to avoid a coal shortage next winter the weekly output of soft coal should be over 11,500,000 tons. This average has not been approximated any week this year.

Reports show that there is no appreciable betterment in the car supply to the mines. Many operations are still working short time. The Fairmont region of West Virginia, however, was receiving a better supply of cars the early part of this week.—*Coal Age.*

—

More Cash For Signal Truck

DETROIT, April 25—At a recent meeting of the board of directors of the Signal Motor Truck Co. an executive committee of three was appointed and its chairman will be in daily attendance supervising the business of the company. It is stated that stockholders and directors have completed arrangements whereby sufficient new cash and credit can be obtained to enable the company to increase its production immediately. It is understood that lack of working capital has hindered both quantity production and the handling of government business.

The offer of the Paige-Detroit Motor Car Co. to purchase the Signal company has been definitely rejected. It is stated that the Signal company has closed contracts since Jan. 1 for more trucks than were manufactured during the whole of 1917 and that with the additional financing the company has sufficient cash to produce all the trucks necessary to meet the demands of dealers.

Men of the Industry

Changes in Personnel and Position

Toole Joins Overland as Division Sales Manager

John F. Toole has been appointed division sales manager of the Willys-Overland Co. in California. He was formerly branch manager for the B. F. Stearns Co. of San Francisco, special representative of the Willys-Knight division of the Willys-Overland Co., and later zone manager, with headquarters in St. Louis.

—

George S. Shugart, formerly western sales manager of the United States Tire Co., New York, has been promoted to the position of manager of branches of the company to succeed O. S. Tweedy, who resigned. Mr. Shugart has also been elected a director of the company.

—

Thomas O'Neill, formerly associated with the Hercules Gas Engine Co., Evansville, Ind., has been appointed assistant general manager of the Worthington Pump and Machinery Corp. at its Cudahy, Wis., plant.

—

George W. Thexton, formerly assistant general manager of the Worthington Pump & Machinery Corp., has been appointed works manager of the Bucyrus Co., South Milwaukee, Wis.

—

Daniel A. Buckley, advertising manager of the Guaranty Motors Co., Cambridge, Mass., has been appointed sales manager of the organization.

—

Charles Johnson, formerly sales manager of the Maltby Auto Specialties Co., and for many years special representative of the Lovell-McConnell Mfg. Co., Newark, has been appointed fiscal agent in Michigan and Ohio for the Square Turn Tractor Co., Chicago.

—

John R. Manning has been appointed sales and advertising manager of the Coleman Tractor Corp., Kansas City. For the past 2 years he has been sales and advertising manager of the Sweeney Automobile & Tractor Training School of Kansas City.

—

Jack Griffin has been appointed advertising manager of the Chevrolet Motor Co. of California, with headquarters in Oakland. He has been in the publicity business for many years.

—

Dr. Herbert W. Kugler and R. E. Glass have resigned from the Firestone Tire & Rubber Co., Akron, and have become associated with the Globe Rubber Tire Mfg. Co., Trenton. Dr. Kugler was identified for 9 years with the Firestone organization, first as chief chemist and later as technical superintendent. G. Glass has been general auditor and member of the executive board of the Firestone organization for the past 7 years.

—

L. E. Brown has been appointed district manager of the Denver branch of the Republic Rubber Co., Youngstown, Ohio.

—

F. M. Bowman has been appointed sales manager of the Douglas Motors Corp., Omaha.

—

J. V. Gilmour has been appointed assistant advertising manager of the Racine Rubber Co., Racine, Wis. He will work with C. R. Collins of the Racine company.

—

Hi Sibley has been appointed publicity manager of the Republic Motor Truck Co., Alma, Mich. He will have charge of both the publicity and local advertising departments.

—

Joseph P. Hall, formerly treasurer-director of the Combination Rubber Mfg. Co., Bloomfield, N. J., has been appointed general manager of the company.

—

M. C. Hogard has been appointed assistant to the vice-president and general manager of the Burd High Compression Ring Co., Rockford, Ill. He was formerly secretary of the Githens Brothers Co., Chicago, and more recently was with the Marmon Chicago Co.

—

Wesley Deem, formerly production manager of the Columbia Motors Co., has been appointed production manager of the Lane Motor Truck Co., Kalamazoo, Mich.

—

L. R. Scafe, for 2½ years secretary and treasurer of the Saxon Motor Car Co., has been appointed comptroller of the Dayton-Wright Aeroplane Co., Dayton, Ohio.

—

H. M. Adams has been appointed New York district manager of the Willard Storage Battery Co., Cleveland, to succeed A. W. Sayre.

—

H. G. McComb has been appointed director of purchases of the Premier Motor Corp., Indianapolis. He was formerly assistant superintendent of inspection in the aircraft engine division of the Nordyke & Marmon Co., Inc.

—

Lane Truck Appoints Representatives

KALAMAZOO, MICH., April 24—The Lane Motor Truck Co. has appointed several sales representatives. B. H. Vail will act as factory representative in Indiana, Ohio and lower Michigan, with headquarters at the factory and Indianapolis. O. H. Pearsall will have the remainder of Michigan and Wisconsin territory. L. H. Cossey has been appointed for western New York and Pennsylvania, and E. P. Lane for the Dakotas and Minnesota. Ralph B. Comins, Boston, will cover all New England territory.

New Companies Formed

Latest Additions to Ranks of Automotive Industries

Several Tire Companies Formed on Pacific Coast

SEATTLE, WASH., April 22—The American Tire Filler Co. has purchased a factory site in Kent, Wash., and will erect a building in which rubber and composition fillers for tires will be manufactured. R. S. Wicks is president of the organization, which is capitalized at $100,000.

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Trubulpruf Tires to Be Made in Washington

PORTLAND, ORE., April 20—The Lambert Trubulpruf Tire Co., recently organized here, has selected a site in Everett, Wash., in which a two-story concrete building will be erected for the manufacture of the Trubulpruf tires.

—

Washington Company to Make Tires

SPOKANE, WASH.. April 20—The Washington Tire & Rubber Co. has been incorporated here and will start work on a factory for the manufacture of automobile tires, tubes and tire accessories. The company's authorized capital is $1,500,000.

—

Trucks Coming From Ohio

YOUNGSTOWN, OHIO, April 22—The Independent Motor Co. has been incorporated here with a capital of $300,000 and will manufacture worm drive trucks. The company has purchased the Wilson Avenue plant of the Miller-Smythe Electric Co., has installed machinery, and expects to be in production in less than 3 months.

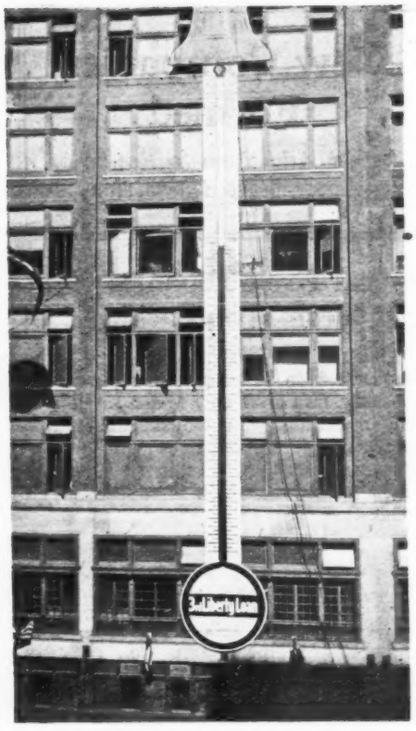
The new company, which is backed by local capital, has purchased the assets of the Independent Motors Co. of Port Huron. A. W. Frantz, formerly president of the Independent Motors Co., has been elected vice-president and general manager of the new organization. P. M. Kennedy is president, Frank Leish, treasurer, and H. C. Mikkelsen, secretary. The board of directors is made up of the officers and Charles H. Smythe.

The first year's production will be limited to 1- and 2-ton trucks, but it is planned to add larger sizes later.

—

Making Car and Tractor Castings

MILWAUKEE, April 22—J. George Shaw, formerly president and treasurer of the Milwaukee Steel Foundry Co., has organized the Shaw Foundry Co. The new company is already engaged in the manufacture of gray iron castings for motor cars and tractors.



This is another Liberty Loan thermometer put up by a Detroit department store. The mercury is seen passing the $38,500,000 mark, slightly more than Detroit's quota. The picture was taken almost two weeks ago

Educational Service for Employers Started

WASHINGTON, April 22—Roger W. Babson, Boston statistician, is now working with the Department of Labor to operate a special educational service for employers. Mr. Babson will give advice on industrial problems to all employers.

Performance Test by Accelerometer

(*Continued from page* 817)

level and on various grades can be determined and may be represented by curves like those of Fig. 4. The tractive effort is the sum of the rolling resistance, the grade resistance and the air resistance. The maximum tractive effort possible, viz., 1275 lb., is shown, and also the tractive effort on direct drive.

From these data the horsepower necessary to cope with various grades can be determined. This is shown in Fig. 5. The actual car speed in the test on the level was 70 m.p.h. Then the engine horsepower curve should cross the horsepower curve necessary for driving on the level at a car speed of 70 m.p.h. From this the mechanical efficiency of the chassis is 78.5 per cent.

The curves clearly show the ability of the car on grades and they also show the uselessness of a four-speed gearset for a car of this design. The second speed is 60 per cent of the direct drive speed and the first speed is about 30 per cent of the direct drive speed. As may be seen from the various curves, the performance is good; in fact, it is better than the average.

General Motors Heavy Bond Subscriber

DETROIT, April 22—Of the $2,500,000 subscribed by the General Motors and Chevrolet companies to the Third Liberty Loan, the Olds Motor Works, Lansing, bought $200,000 worth of bonds. Michigan factories subscribed a total of $1,700,000, or more than 50 per cent. The plants and their quotas follow:

Flint	$650,000	Tarrytown	$50,000
New York	500,000	Fort Worth	50,000
Detroit	500,000	Oakland	50,000
Lansing	200,000	St. Louis	50,000
Pontiac	200,000	Bay City	50,000
Saginaw	100,000	Toledo	50,000

Detroit has a unique Liberty Loan thermometer. The Crown Prince is shown taking the temperature of the Kaiser. As the amount subscribed in Detroit increases, the Kaiser's temperature gets higher and higher

Plan 5 Private Motor Express Routes

WASHINGTON, April 22—Five motor express routes to carry food into Washington from Virginia will be established by private organizations within 60 days.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Change
*Ajax Rubber Co.	50	60	..
*J. I. Case T. M. Co. pfd.	85¼	88¼	— ½
Chalmers Motor Co. com.	6	8	..
Chalmers Motor Co. pfd.	30	40	..
*Chandler Motor Co.	81	83	+2
Chevrolet Motor Co.	122	124	+2
*Fisher Body Corp. com.	26	34	—1
*Fisher Body Corp. pfd.	75	87	+3
Fisk Rubber Co. com.	50	53	..
Fisk Rubber Co. 1st pfd.	98	103	..
Fisk Rubber Co. 2nd pfd.	70	75	..
Firestone Tire & Rubber Co. com.	94	96	..
Firestone Tire & Rubber Co. pfd.	95	97	—1
*General Motors Co. com.	120	122	+2½
*General Motors Co. pfd.	78	80	—2
*B. F. Goodrich Co. com.	44	47	+3
*B. F. Goodrich Co. pfd.	93	99½	— ½
Goodyear Tire & Rubber Co. com.	139	141	+1
Goodyear Tire & Rubber Co. pfd.	96½	97½	—1½
Grant Motor Car Corp.	3	4	..
Hupp Motor Car Corp. com.	2¾	3½	..
Hupp Motor Car Corp. pfd.	80	85	—2
International Motor Co. com.	20	23	..
International Motor Co. 1st pfd.	51	56	..
International Motor Co. 2nd pfd.	22	28	..
*Kelly-Springfield Tire Co. com.	41	43	—2
*Kelly-Springfield Tire Co. 1st pfd.	75	85	+2
*Lee Rubber & Tire Corp.	12	13	..
*Maxwell Motor Co., Inc., com.	28	30	+3
*Maxwell Motor Co., Inc., 1st pfd.	55	57	+3
*Maxwell Motor Co., Inc., 2nd pfd.	21½	22	+1
Miller Rubber Co. com.	104	106	—3
Miller Rubber Co. pfd.	96	97	—1
Packard Motor Car Co. com.	93	95	—1
Packard Motor Car Co. pfd.	89	92	..
Paige-Detroit Motor Car Co.	16	18	..
Peerless Truck & Motor Corp.	14	16	..
Portage Rubber Co. com.	106	107	—3
Reo Motor Car Co.	14¼	15¼	— ¾
*Saxon Motor Car Corp.	5	7	—2
Standard Motor Construction Co.	12	14	+1½
Standard Parts com.	..	70	..
Standard Parts pfd.	..	97	..
*Stewart-Warner Speed Corp.	54½	55½	+ ½
*Studebaker Corp. com.	38½	40	+1
*Studebaker Corp. pfd.	80	90	..
Swinehart Tire & Rubber Co.	25	35	..
United Motors Corp.	25½	26¼	+ ½
*U. S. Rubber Co. com.	54	54½	+1½
*U. S. Rubber Co. pfd.	102	104	—1
*White Motor Co.	41	43	..
*Willys-Overland Co. com.	17	18	..
*Willys-Overland Co. pfd.	79	81	..

*At close. Listed N. Y. Stock Exchange.

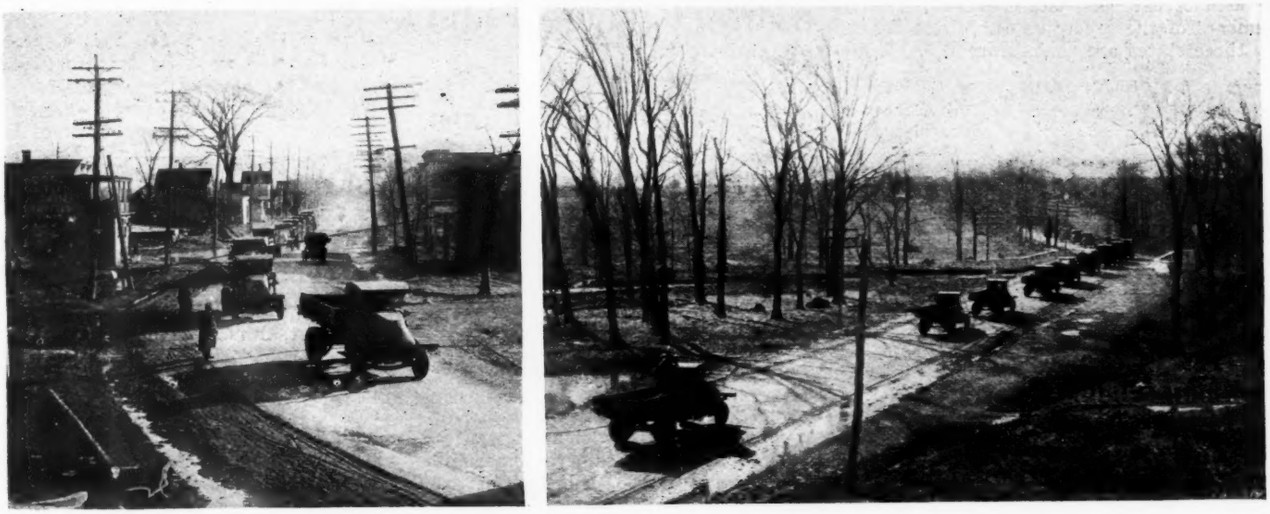
OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Change
Auto Body Co.	..	8	..
Bower Roller Bearing Co.	..	..	..
Chevrolet Motor Co.	..	..	..
Commerce Motor Car Co.	..	10½	..
Continental Motor Co. com.	5½	5¾	..
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	..	..	..
Edmunds & Jones pfd.	..	..	..
Ford Motor Co. of Canada	203	208	+3
Hall Lamp Co.	..	..	..
Michigan Stamping Co. com.	13¼	..	— ¼
Motor Products	..	..	..
Packard Motor Car Co. com.	92	..	+2
Packard Motor Car Co. pfd.	90	91½	— ¼
Paige-Detroit Motor Car Co.	16¾	..	+ ¼
Prudden Wheel Co.	..	13	..
Reo Motor Car Co.	15⅜	16	+2¼

INACTIVE STOCKS

Atlas Drop Forge	..	26	..
Kelsey Wheel Co.	90	92	..



Fleet of 60 Mack trucks which made the trip from the Twenty-third Engineers' Depot, Harrison, N. J., to Camp Belvoir, Va., carrying a full complement of three officers and 104 men. The pictures were taken on the Lincoln Highway near South Amboy, N. J.

Will Link All of New England With Many Return Load Bureaus

Organization Formed to Establish These in Every State—Connecticut Will Help Systematize Service

PROVIDENCE, R. I., April 18—One of the biggest steps yet taken in the development of Return Loads Bureaus in the United States was made here to-day at the Providence Chamber of Commerce, when the New England Highways Return Loads Assn. was formed. This organization will establish Return Loads Bureaus throughout all of New England, but more particularly at the present time in Rhode Island and Massachusetts. Connecticut already has a very efficient Return Loads Bureau organization in operation, and the various bureaus in Connecticut will co-operate with those to be established in Massachusetts and Rhode Island to the end that the entire New England district will be served by its motor trucking equipment to the best possible advantage during the summer of 1918 and this fall, and in the spring of 1919. Officers of the new association were elected as well as an executive committee of six made up of two members from each of the States of Connecticut, Massachusetts and Rhode Island. The working organization is now being planned and letters being prepared to be sent out to shippers and truckmen for the necessary information.

The meeting to-day was for the purpose of electing a set of permanent officers for the organization, a preliminary meeting to broach the subject of Return Loads Bureaus in New England having previously been held on March 20. To-day's meeting was attended by forty-two men interested in the Return Loads Bureau from the angle of either the shipper or the truckman. The various government departments were also represented.

George H. Pride, of the Highways Transport Committee of the Council of National Defense, addressed the meeting, and told of the acute railway congestion which is bound to hit New England this fall and winter if a larger use is not made of the roadways for transportation. He pointed out that all of the food, clothing and other materials formerly consumed by the members of the draft army selected from the territory remote from the Atlantic seaboard will have to be shipped to the Eastern coast this year for trans-shipment overseas. He gave it as his opinion that the volume of these goods will be so great as to offset any increased efficiency in the railway organization resulting from government ownership and control.

Will Aid Market Bureau

J. C. Gilbert, of the United States Bureau of Markets, with offices at 148 State Street, Boston, Mass., addressed the meeting, and assured all those interested in the establishment of Return Loads Bureaus that they would be a great benefit to his department of the government in that they would result in a greater use of motor trucks to transport the farmers' products from the farms into the markets, and similarly carry back from the cities goods which the farmers require.

F. W. Aldred, chairman of the Commercial Economy Board of Rhode Island, who was elected temporary president of the association, pledged the support of his board and the personal support of Governor Bookman of Rhode Island to the Return Loads Bureau work in order that the serious congestion which prevailed in Rhode Island during the winter of 1917 will not be repeated again this year.

Joseph Husson, editor of *The Commercial Vehicle*, who has made a study of the advance of the Return Loads Bureau idea in all parts of the country where it is in the course of development, told of the necessity for co-operation between the Return Loads Bureau organization and the highway departments of the various states to the end that the roads might be cleared of snow sufficiently to enable trucks to run over them without interference, especially in cases of severe storms. Rhode Island has taken no steps in such co-operation, although there is now a bill before the Massachusetts legislature to provide sufficient moneys to keep the roads clear of snow from Nov. 1 to May 1 each year. Only the main through routes are to be cleared at first. The sum appropriated will be used also for the purchase of motor trucks, draft animals, tools and equipment as necessary for the snow removal work.

W. S. Conning, who was largely instrumental in organizing the Return Loads Bureau in the State of Connecticut, told of his experience in the work and his willingness to co-operate with the States of Massachusetts and Rhode Island in the formation of one large bureau for all of the industrial centers of New England.

To Appoint New President

F. W. Aldred, who was elected temporary president of the new association, will not be able to devote his time to the work because of his duties on the Commercial Economy Board, and he has suggested to Governor Bookman of Rhode Island that the latter appoint a new president, who will have the power to select his own secretary and treasurer. Major L. H. Ullman, New Haven, Conn., was elected first vice-president, and Stoughton Bell, of the Boston Chamber

of Commerce, second vice-president. The members of the executive committee for the three states are as follows:

Rhode Island

Ex-Gov. C. D. Kimball.....Providence
E. C. Southwick.....Providence

Massachusetts

E. F. Rowe.....New Bedford
John C. Robinson.....Springfield

Connecticut

W. S. Conning.....Hartford
M. B. Russell.....Bridgeport

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Rolls-Royce Capital Doubled

LONDON, ENGLAND, April 20—At the annual meeting of Rolls-Royce, Ltd., held recently, it was voted to increase the capital from £200,000 ($950,000) to £400,000 ($1,900,000), subject to the approval of the British Treasury. The new shares are to be issued against an accumulated reserve of £229,000 ($1,088,000). A cash dividend of 10 per cent for the year, less income tax, was also declared.

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Acetylene as Fuel in Norway

CHRISTIANIA, NORWAY, April 15—Experiments are being made in Norway to operate automobiles with acetylene gas, as no gasoline has been obtainable for many months and practically no cars have been running. If acetylene is found to be practical for motor cars, it can be manufactured in large amounts from calcium carbide, of which Norway has a great supply.

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Newark Gathering Truck Statistics

NEWARK, N. J., April 24—The Newark Motor Truck Club, through its return load bureau, and in co-operation with the transportation committee of the Board of Trade, is gathering statistical information with regard to every motor truck in the city. The name of the owner, the capacity, and the percentage of the capacity actually used, will be noted, and if there is another period of freight congestion next winter, this information will furnish one means of relief. The established lines of motor trucks that run regularly on fixed routes will also be ascertained.

Colonel George Pope Dies

Was Treasurer of N.A.C.C. and President of National Association of Manufacturers

HARTFORD, CONN., April 20—Col. George Pope, president of the National Association of Manufacturers, treasurer of the National Automobile Chamber of Commerce, and formerly treasurer of the Pope Mfg. Co. of Hartford, died at his home here yesterday, in his seventy-fifth year.

Colonel Pope has been connected with the Pope Mfg. Co. in various capacities since 1890, when he became president of the Hartford Cycle Co., a branch of the Pope Cycle Co. founded by his cousin, the late Col. Albert A. Pope. In 1899, when many bicycle interests were merged into the American Bicycle Co., George Pope was elected vice-president of the concern, and later president of the reorganized Pope Mfg. Co.

Long Interested in Cars

Colonel Pope's first active interest in automobiles was in 1897, when his company put on the market several Columbia electric phaetons. He was at one time chairman of the Show Committee of the Association of Licensed Automobile Manufacturers, and the Automobile Board of Trade. It was largely through his efforts that the early automobile shows were successful, and he had active charge of the work in the New York shows from 1903 to 1913. When the Electric Vehicle Manufacturers' Association was formed in February, 1906, he was elected president.

Col. George Pope was born in Boston on Jan. 9, 1844, of an old New England Puritan family. At the age of four his parents moved to Brookline, Mass., where the boy attended public school. At 16, he began his business career in a wholesale dry goods house, and in 1862 enlisted in a Massachusetts regiment for service in the Civil War. In August, 1865, he was honorably discharged with the rank of Lieutenant Colonel of the 54th Massachusetts regiment. Colonel Pope in the campaign of 1896 was a presidential elector-at-large in Connecticut.

To Move Chevrolet Work to Tarrytown

NEW YORK, April 22—The Chevrolet Motor Co. will move its manufacturing, sales and accounting activities to the company's factory at Tarrytown, which will absorb all the factory work of the Eastern territory, known as "Zone No. 2." Freight difficulties have made this necessary. Local service will continue to be given in New York, and the Chevrolet salesroom at Fifty-seventh Street and Broadway will also be continued. The states included in Zone 2 are Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Virginia and Maryland.

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Crude Oil Production Increases

WASHINGTON, April 23—Production of crude oil during March was 176,000 barrels, more than twice as much as the February amount. This was also an increase of 50,000 barrels over March, 1917, and 20,000 over March, 1916.

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More Ordnance Contracts

WASHINGTON, April 19—The Ordnance Department has placed the following contracts recently:

Ohio Trailer Co., Cleveland; 10-ton experimental trailers.

Four Wheel Drive Auto Co., Clintonville, Wis.; copies parts, price list catalog, copies instruction book.

Holt Mfg. Co., Peoria, Ill.; 45-hp. caterpillar tractors.

Quartermaster Depot, Chicago; Indian motorcycles with sidecars.

Packard Electric Co., St. Catharines, Ontario, Canada; No. 103 British experimental fuse, Mark V.

T. A. Wilson & Co., Reading, Pa.; amber eyeglasses and metal cases (miscellaneous equipment for antiaircraft project).

Taft Pierce Mfg. Co., Woonsocket, R. I.; angle irons, No. 192; parallels steel.

Michigan Copper & Brass Co., Detroit; brass rods and strips for manufacturing Mk. III. Det. fuse.

B. F. Goodrich Rubber Co., Akron; 25 ft. lengths, ½-in. 5-ply quarry, air-drill hose, extra male half couplings, extra female half couplings.

General Electric Co., Schenectady, N. Y.; 3-hp. 220-volt induction motors with pulleys and C.R. starters; 1/6-hp. 110-volt motors.

Chicago Pneumatic Tool Co., Philadelphia; No. 3 reversible Little Giant air drills for U. S. drill for filling plant.

Gray & Davis, Boston; pellet casings 51G for mark I fuse; cloth washers, 51Q for mark I fuse; copper charge cover rings 51X for mark I fuse; copper charge covers, 51Z for mark I fuse; asbestos washers, 51U for mark I fuses.

L. C. Chase Co., Boston; cartridge belts for Browning Colt riflemen belts.

Boston Auto Gauge Co., Boston; magnetic gauges for chemical plant No. 103.

Waltham Watch Co., Waltham, Mass.; mechanical fuse, unsectionalized; mechanical fuse, sectionalized.

Calendar

RACING

May 16—Uniontown. Uniontown Speedway Assn.
May 30—Sheepshead Bay, N. Y. Championship races.
June 22 — Chicago. Chicago Speedway.
July 4—Cincinnati. Cincinnati Speedway.

ASSOCIATIONS

May 10—New York. Highway Traffic Assn. 8.30 P.M. Automobile Club of America Bldg.
May 13-18—Cleveland. War Convention of Machinery, Tool & Supply Industry of the United States.
June 3-4 — Chicago. National Gas Engine Assn. Eleventh Annual. Hotel Sherman.
June 5-12—Hot Springs, Va., National Assn. Automobile & Accessory Jobbers.
June 17-19—Dayton, O., Society Automotive Engineers, Annual Midsummer Session.

SHOWS

May 3-7 — Lima, Ohio, Ohio State Automobile Assn.
Sept. 23-28—Chicago, National Accessory Show for Fords. Coliseum.

ENGINEERING

June 26-28 — Buffalo, N. Y. American Society of Heating and Ventilating Engineers.
Sept. 2 — Cripple Creek, Colo. American Institute of Mining Engineers.
Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg. 29 West 39th Street.